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WORLD HEALTH ORGANIZATION

LET *us always remember that leprosy is not a social stigma, but an intensely interesting disease demanding the attention of the best minds, and offering a rich and, as yet, largely unexplored field for research.*

COCHRANE

AUJOURD'HUI *l'homme n'est plus la proie d'une lèpre inéluctable. Il sait même mieux se défendre contre elle que contre la tuberculose. Ce ne sont donc plus les armes qui lui manquent, mais la ferme volonté d'agir et la persévérance dans l'action.*

CHAUSSINAND

INTERNATIONAL WORK IN LEPROSY, 1948-1959 [1]

INTRODUCTION

Leprosy, which may affect between 10 and 12 million people throughout the world, is a disease of many as yet unsolved problems. It is accepted that the causative organism is *Mycobacterium leprae*, but this organism has never been cultivated outside the human tissues, and there is no satisfactory evidence that the disease can be transmitted experimentally to animals or to man, in spite of many attempts at transmission. The structure of *Myco. leprae* in the treated and in the untreated case raises many unanswered questions in the realm of bacteriology. Although leprosy is a communicable disease of bacterial origin, the host-parasite relationship is not well understood. Thus, in endemic areas most adults appear to be resistant. Before puberty susceptibility seems to be higher than it is in later life, although even this is contested. No laboratory procedures exist to measure specific immunity to the disease. A specific antigen is lacking, a situation which is complicated by the fact that *Myco. leprae* bears an antigenic relationship to other acid-fast organisms, especially *Myco. tuberculosis*. Indeed, tuberculosis is the most frequent concurrent infection, and is often the cause of death of the leprosy patient. The demonstrable existence of antibodies is no index of effective defence against the disease; in fact, the greater their amount, the less the resistance of the tissues.

The degree of infectivity of the disease is another much debated point. Prolonged intimate contact is postulated for infection to be transferred, but some leprologists doubt whether it need be prolonged, and hold the view that repeated contact is enough, perhaps even a single contact in suitable circumstances. The duration of the incubation period is not exactly known, but it is very long. It cannot be measured accurately until a reliable diagnostic test is devised that will show when a person is infected. Nor are these the only controversial questions. It is not known whether infection occurs through the skin or through the upper respiratory tract; it may be through both. Males are affected more frequently than females, but whether this is because of some inborn characteristic or because of increased opportunities of contact has not been determined. The influence of race, diet and climate is unknown; no-one is now prepared to assert roundly, as Jonathan Hutchinson did in the last century, that leprosy is caused by eating fish, especially bad fish. Finally, the disease is so protean in its manifestations that the classification of the various forms is still the subject of much confusion and controversy.

In the realm of prophylaxis, although happily not in that of treatment, there is one major subject of controversy: the role of BCG vaccination. The use of BCG is based on the observation that the tuberculoid form of leprosy is often self-healing and is characterized by a strong lepromin reaction; the argument is favour of BCG is that it makes the lepromin test positive and therefore stimulates a tissue defence mechanism which, if it does not prevent a person from contracting leprosy, will at least prevent him from contracting the more dangerous form of the disease. Many leprologists regard this argument as fallacious.

With so many problems unsolved, it is not surprising that in the Christian Medical College, Vellore, South India, it is quite usual for students when they arrive to be shown leprosy cases as an introduction to all branches of medical science.[2] The study of

[1] This survey has been prepared with the assistance of Dr J. Gay Prieto, Chief Medical Officer, Leprosy, WHO Headquarters. The parts on differential diagnosis and treatment were prepared by Dr V. Martínez-Domínguez. The whole will be published in booklet form as one of a series of studies devoted to particular fields of WHO activity. The previous publications in the series were: *Treponematoses : a world problem*, by T. Guthe & R. R. Willcox (1954); *Malaria : a world problem*, by E. J. Pampana & P. F. Russell (1955); *Disease control and international travel*, by H. S. Gear & Z. Deutschman (1956); and *International work in bilharziasis, 1948-1958* (1959).

[2] Cochrane, R. G. (1959) *Leprosy in theory and practice*, Bristol, John Wright, p. 256.

leprosy does indeed require the co-operation of anatomist, physiologist, bacteriologist, radiologist, physician and surgeon. Happily an attack, and a successful attack, on the disease can be made without waiting for solutions to all its problems.

The following pages describe the work of WHO in the field of leprosy.

LEPROSY IN THE PAST

It was long believed that the disease " zaraath " described in Leviticus XIII and XIV is leprosy. Since the beginning of this century, however, opinions have differed about the interpretation of this word; certain authors hold that zaraath does represent leprosy as it is known today; others think it is a group of skin diseases totally different from leprosy. Whichever the correct interpretation, the disease mentioned in Leviticus is not just an ordinary disease, it is a divine chastisement; the leper is an impure person and has to be segregated from society. The horror and loathing inspired by the leper are partly derived from this biblical view of him as a person who has incurred divine disfavour, partly also derived from the mutilations and deformities that may occur in this disease and are often repellent in aspect.

During the Middle Ages leprosy increased considerably in Europe; in 1244 there were more than 19 000 leprosaria in Christendom — in France alone more than 2000.[3] The biblical attitude to the disease was a marked feature of the Middle Ages, and led to the indiscriminate and compulsory segregation of all lepers. Priests were charged with the execution of the sentence of segregation. When someone was pronounced to be a leper, a decree was published in the parish church, and the following Sunday the parish priest met the leper, who now had to dress in black, at a place outside the town, conducted him to the church and there, in a place set apart, administered the last mass. Afterwards, the leper was conducted to a neighbouring leprosarium in which a temporary hut had been built. The priest then took a handful of sand from the roof of the hut and pronounced the terrible sentence: " *Sis mortuus mundo, vivas iterum Deo* (" Henceforth be dead to the world, and live in God.").

Then the prohibitions to lepers were read out. They could not enter churches, mills, markets, or any public meeting-place; wash their hands or personal property in rivers used by healthy persons; touch anything for sale with their hands, only with a stick; or walk barefoot. They had to dress only in the black leper's habit, carry a rattle to warn people of their approach, and avoid narrow roads to prevent dangerous contact. They were required not to answer the questions of healthy persons if the latter were against the wind, so that infection should not be carried down wind. The civil laws prohibited them from buying property, making wills, and inheriting property.

Little by little, owing possibly to the severe segregation measures, but also possibly just as much to the improvement in living conditions in Europe, leprosy began to decrease, and in France in 1644 Louis XIV suppressed all leprosy institutions.[4]

THE LEGEND OF LEPROSY

The long series of religious stories about leprosy, the popular belief that leprosy inevitably gives rise to deformities and mutilations, the great number of unknown factors in the etiology and pathology of the disease, and the fact that for many years its study has been isolated from the general stream of medical progress have all contributed to create and perpetuate the legend of leprosy, with support also from literature and painting.

This legend is based on three false assumptions: that leprosy is a very contagious disease, perhaps the most contagious of all diseases; that it is incurable; and that leprosy patients are people apart, accursed, and possessed of a special psychology.

This legend is deeply rooted in the minds of most people, at all levels of society; it makes for considerable difficulty in advancing

[3] Sauton, J. (1901) *La lèpre*, Paris, Maloine

[4] Sánchez Covisa, J. (1928) *Discurso de ingreso en la Real Academia Nacional de Medicina*, Madrid

knowledge of the disease, and is a serious drawback in most of the countries for which leprosy control campaigns are being planned. The first objective of the leprosy education of the public should be to counteract and destroy the legend, and convince people that leprosy is a disease like other diseases, and less contagious than others, than tuberculosis, for example. It is a very curious phenomenon that the people who are the first to protest indignantly at the idea of indiscriminate segregation of tuberculosis patients accept and even demand the indiscriminate segregation of leprosy patients, who are much less contagious.

CLASSIFICATION AND SPREAD

In the first scientific publications on leprosy in this century two different clinical forms were distinguished, with transitional stages between: cutaneous or tuberous leprosy, and neural or anaesthetic leprosy, there being also mixed cases having symptoms in both the skin and nerves. These classifications were approved by the Leonard Wood Memorial Round Table Conference at Manila in 1931.[5]

At the Fourth International Congress on Leprology in Cairo in 1938 [6] the malignant (lepromatous) type was defined as being characterized clinically by the presence of skin lesions (generally lepromata), bacteriologically by the numerous bacilli in globi in the nasal mucosa and skin lesions, histologically by the existence of lepra cells, and immunologically by the negativity of the Mitsuda lepromin reaction. This classification remained unchanged at the Sixth International Congress.

The neural form was held to include all non-lepromatous clinical types of leprosy: the polyneuritic, maculo-anaesthetic, and tuberculoid. Many leprologists have remained more or less attached to this classification into lepromatous and neural forms. The leprologists of South America have never accepted it, however, and in the following years, first at regional meetings and then at the Second Pan American Conference on leprosy in Rio de Janeiro in 1946,[7] they adopted a system of classification suggested by Rabello, which was afterwards approved by the Fifth International Congress on Leprology, Havana, 1948.[8]

At this Congress, two polar types of leprosy were admitted, defined by their clinical, bacteriological, histopathological and immunological characteristics: the lepromatous type of the Cairo Congress, and a tuberculoid polar type in which there are arciform skin lesions with a tendency to peripheral spread and central healing, without bacilli (or, exceptionally, with very few bacilli), with a strong reaction to lepromin, and presenting a tuberculoid histopathological picture. In addition to these polar types of stable form, there exists an unstable indeterminate group which after a certain time evolves towards one or other of the polar types, or undergoes regression. In this type the cutaneous lesions are macular; cases may be bacteriologically positive but are more frequently negative; the Mitsuda reaction is negative or sometimes positive, but if positive is less intense than in the polar tuberculoid form; and the histological picture shows an uncharacteristic inflammatory reaction.

This classification was adopted in spite of protests by a great number of leprologists. Professor Gay Prieto, in the face of the dogmatic insistence of South American authors on two opposed polar forms, expressed the view that " Nature ignores the rigid moulds into which we attempt to fit the observed clinical facts, and consequently there must necessarily exist intermediate forms which constitute the links of an unbroken chain which connects the polar forms ".[9]

In the report of a WHO Expert Committee on Leprosy which met in Rio de Janeiro in 1952 [10] the over-rigid conclusions of the Havana Congress were mitigated. The Committee recognized the existence of the two polar types, lepromatous and tuber-

[5] *Int. J. Leprosy*, 1934, **2**, 327
[6] *Int. J. Leprosy*, 1938, **6**, 389
[7] *Int. J. Leprosy*, 1947, **15**, 100
[8] *Memoria del V Congreso Internacional de la Lepra*, La Habana, Editorial Cenit, 1949, p. 73
[9] Gay Prieto, J. (1952) *Int. J. Leprosy*, **20**, 438
[10] *Wld Hlth Org. techn. Rep. Ser.*, 1953, **71**

culoid, subdividing the latter into major, minor, and reactional forms, but gave a more comprehensive definition of the indeterminate group as:

"A benign form, relatively unstable, seldom positive on bacteriological examination, presenting flat skin lesions which may be hypopigmented, erythematous, or hyperpigmented, with a reaction to lepromin variable from case to case. Polyneuritic manifestations may develop in cases which have persisted in this form for long periods. The indeterminate form consists essentially of the 'simple macular' cases and comprises those cases previously known as 'maculo-anaesthetic'. Cases of this form may evolve toward the lepromatous form or the tuberculoid form, or may remain unchanged indefinitely."

A fourth group, "borderline leprosy" was also defined as: "A malign form, very unstable, almost always strongly positive on bacteriological examination, generally negative to lepromin. This form frequently arises from the tuberculoid form as a result of repeated reactions, and sometimes evolves to the lepromatous form."

The Sixth International Congress on Leprology, held in Madrid in 1953,[11] made only one change in the classification formulated by the Expert Committee on Leprosy, adding a new category, macular tuberculoid leprosy, characterized by flat skin lesions with very well-defined edges and a tendency to central healing.

H. W. Wade, in a special note,[12] proposed to add two further groups to the four groups adopted by the Madrid Congress: a maculo-anaesthetic group, and a polyneuritic group without skin lesions, on the ground that it would not be possible to classify more exactly the cases without skin symptoms. It was held, however, that the suggested maculo-anaesthetic group had been included partly in the indeterminate group, partly in the tuberculoid polar type, as macular tuberculoid.

A comparison of the classification of the WHO Expert Committee and of the Madrid Congress appears in Table 1, together with a simple classification of the population for the purposes of mass leprosy campaigns.

The differences of opinion among leprologists on the classification of manifestations of the disease are rooted in the diversity of these manifestations. It is argued that the classification adopted at the suggestion of the South American leprologists is not really a classification at all but the expression of physiopathological doctrine, for it is impossible to classify a disease according to four different criteria. In any case, the pattern of leprosy, the dominance of one or other of the clinical forms, changes considerably from one country to another. There are very few leprologists with a wide knowledge of all the regional variations of the disease, and individual leprologists in discussions about classification tend to speak only of their own experience, which may be very different from that of the other speakers. The majority of leprologists have in mind one static and immutable disease, but leprosy, like other diseases, and indeed like the manifestations of life itself, is constantly changing and subject to transformation. It is not only the indeterminate groups, it is held, which are unstable and changeable; the polar types at the beginning of their evolution are subject to mutation, and the transition from tuberculoid to lepromatous type has been observed by all experienced leprologists. In exceptional cases, indeed, some leprologists claim to have observed the evolution of the lepromatous type first towards the borderline group and then towards the tuberculoid polar type. From the point of view of public health, however, especially in the organization of mass campaigns against leprosy, it is more important to classify the population in which the disease appears, than it is to classify the disease itself into categories meeting the approval of all leprologists.

The WHO Expert Committee on Leprosy which met in 1952 proposed an "administrative classification" of leprosy into two forms: "open" and "closed" (infectious and non-infectious), depending on whether the cases are bacteriologically positive or negative when assessed by standard methods of examination of the skin lesions or nasal mucosa.

[11] *Memoria del VI Congreso Internacional de Leprologia*, Madrid, 1953, p. 75

[12] *Memoria del VI Congreso Internacional de Leprologia*, Madrid, 1953, p. 79

TABLE 1. CLASSIFICATIONS OF LEPROSY

Classification of WHO Expert Committee on Leprosy, 1952	Classification of Sixth International Congress on Leprology, Madrid, 1953	Classification of the population for the mass campaign
Type L Lepromatous polar type	Type L Lepromatous polar type	Multi-bacillary forms
Group B Borderline group	Group B Borderline or dimorphous group	Open forms
Group I Indeterminate or maculo-anaesthetic group	Group I Indeterminate group	
Type T Tuberculoid polar type	Tuberculoid polar type: Type T	
	Macular tuberculoid	Sometimes open forms
	Reactional tuberculoid	Forms with few bacilli
	Minor tuberculoid	
	Major tuberculoid	Closed forms
		Latent cases, arrested or burnt-out cases for surveillance
		Contacts of multi-bacillary forms for prophylactic treatment
		Contacts of forms with few bacilli for surveillance
		Rest of the population including contacts of closed forms

There are also arrested or burnt-out cases, in which a relapse is possible. The contacts of these cases, who are particularly exposed to infection, should be kept under surveillance, and sometimes given prophylactic treatment. As for the rest of the population, if the prevalence rate is very high practically all persons should be considered as contacts and placed under periodical surveillance.

A WHO Expert Committee on Leprosy, which met in August 1959, agreed that radical changes in classification from leprosy congress to leprosy congress should be avoided, as they would inevitably lead to confusion and neutralize all efforts to arrive at the universal use of the same terminology. It felt, however, that the classification adopted at the Madrid Congress and endorsed at the Tokyo Congress [13] is capable of improvement in detail, and that the number of categories of leprosy might perhaps be increased to provide a complete picture of the disease in all its manifestations.

The request made at Tokyo that two subordinate groups, the maculo-anaesthetic and the pure polyneuritic, be recognized had met with opposition, probably based on a misunderstanding of what exactly the groups would consist of and how their recognition would affect the basic principles of classification. The advocates of these new groups should, the Committee thought, publish the reasons for their views, giving their opponents time to express their objections, so that full consideration could be given to the question

[13] See page 16.

at the next international congress in 1963. In the meantime, to avoid confusion in the use of the terms " dimorphous " and " borderline ", the decision of the Tokyo Congress should be respected.

Generally, the main factor in the spread of leprosy has been considered to be the infectiousness or non-infectiousness of the leprosy cases, but two other important factors should be considered. One is individual susceptibility, which determines that not all the individuals in (often intimate and prolonged) contact with open (lepromatous) cases develop the disease. Susceptibility is greater in childhood, but in some individuals does not diminish with age; certain adults are so susceptible that occasional contact, e.g., a visit to an endemic area, is sufficient for them to become infected. The other factor is resistance to the disease, which can be absolute. The fact of resistance explains the low rate of conjugal leprosy, and the very few cases appearing in the personnel of leprosaria. It is illustrated by the exceptional clinical observations made by Gay Prieto and Contreras [14] on a young man of 26 years, who for 14 months was inoculated with the blood of patients with strong lepra reactions, with the mucus from lepromatous patients laden with bacilli, and with biopsy fragments. After 8 years of observation he had not developed the slightest suspicion of leprosy.

Relative resistance, shown by a positive Mitsuda reaction, has as a result that subjects, when they become infected with leprosy, get only the tuberculoid type. The combination of high susceptibility and high resistance, very frequent in children, explains why about 60% of infected children show the tuberculoid forms, which can heal spontaneously, and may also explain the patterns found in certain endemic areas, as in Africa, in which a high prevalence rate coincides with a very low lepromatous rate.

EXTENT OF THE PROBLEM

The registration of leprosy cases is notoriously difficult, since the disease is prevalent in under-developed countries, which often cover vast areas, and there is no way of telling how many cases remain undiscovered in remote villages that are difficult or even impossible to reach. The fear of the stigma attaching to leprosy and of confinement in a leprosarium encourages sufferers to hide the disease as long as possible. Diagnosis, although generally not very difficult, presents pitfalls for certain types of leprosy. There are some individuals who spend most of their lives in leprosaria without actually having the disease, and there are no doubt even more, who, though suffering from leprosy, have been and are still being wrongly diagnosed as cases of yaws, ringworm, or nutritional or parasite diseases (see page 25). But by far the greatest obstacle to the compilation of adequate statistics on leprosy is the fact that the largest numbers of leprosy cases are to be found precisely in those countries where statistical services, if they exist at all, are only in embryonic form.

In these circumstances, the only information on the extent of the problem consists of the estimates provided by experts or institutions dealing with the disease, and the official figures of registered cases in each country supplied by governments to WHO. The unreliability of the first type of information is shown by the fact that it usually varies according to the individual or institution supplying it, so that there is a choice of several figures which may differ widely. The official government figures, though in some cases reasonably accurate, do not as a rule reflect a true picture of the prevalence of the disease, but merely indicate the degree of development of the country's statistical services. In a large country, one or several districts, provinces or other administrative entities may supply fairly accurate figures, while others may supply none at all, so that the total figures for the country remain unsatisfactory.

Again, statistics for peoples living in countries where social and economic conditions are rapidly changing may be little more than guesswork. For example, one country in the Western Pacific Region reported 15 000 cases of leprosy as being under treatment in 1950, 22 000 in 1951,

[14] Gay Prieto, J. & Contreras, F. (1953) *Immunidad y contagio en el adulto.* In: *Memoria del VI Congreso Internacional de Leprologia*, Madrid, p. 475

Estimated prevalence of leprosy : high moderate low very low ? *no information*

15 000 in 1952, 22 000 in 1953, 16 000 in 1954, 18 000 in 1955 and 24 000 in 1956. It is obvious that the variations are not entirely explained either by the number of cases cured or by new cases appearing from year to year. They largely reflect the erratic nature of the reporting, understandable in a new nation struggling to solve social and economic problems of enormous size. The inadequacy of such figures for an evaluation of the extent of the problem is shown by the fact that, according to figures submitted to the WHO Inter-Regional Leprosy Conference at Tokyo in 1958, the estimated number of cases for the country was 100 000.

It is one of WHO's tasks to make available, in its monthly *Epidemiological and Vital Statistics Report* and its *Annual Epidemiological and Vital Statistics*, the vital statistics, whether complete or incomplete, supplied by governments. For the reasons given above, any attempt to analyse the figures on leprosy given in these publications might produce misleading results. However, incomplete as they are, the figures do at least give an idea of which countries are most affected.

In addition to the figures supplied by governments for inclusion in WHO's statistical publications, the Organization obtained in 1958 and 1959 some further information on the number of registered leprosy cases through a questionnaire to governments interested in leprosy control. Other quantitative data are obtained from the leprosy control programmes undertaken with WHO help and from WHO experts who visit from time to time the regions where the disease is most highly prevalent.

From all these data, it is clear that at least 2 million cases of leprosy are at present *registered* throughout the world, three-quarters of them being under treatment. The actual number of cases is of course higher, some authorities putting it at between 10 and 12 million. *The figures given below therefore refer to the estimated number of cases, unless otherwise indicated.*

Asia is considered to be the world's most important focus of leprosy, no part of the continent being free from the disease. The countries and territories most affected include: India (about 1 500 000 cases); Burma (about 200 000 cases); Thailand (about 200 000 cases); Indonesia (about 100 000 cases); Japan (about 15 000 cases); China (Taiwan) (about 8000 cases); Hong Kong (about 7000 cases); Ceylon (about 3500 cases). Endemicity is thought to be low in western Asia and Siberia. There are about 20 000 cases in the Philippines.

The whole of Africa is infected with leprosy, the prevalence being particularly high in Nigeria (Northern Region) and in the territories formerly known as French West Africa and French Equatorial Africa. Estimates of the total number of leprosy sufferers in the continent range between 1 ½ and 2 million. Estimates for individual countries and territories include: Nigeria (more than 500 000 cases); French West Africa (about 500 000 cases); French Equatorial Africa (about 150 000 cases); Sierra Leone (about 100 000 cases); Tanganyika (about 100 000 cases); Mozambique (about 80 000 cases); Uganda (about 70 000 cases); Madagascar (about 35 000 cases); Togo (about 22 000 cases).

South America constitutes another major focus of the disease, the prevalence being high in Brazil, Colombia and Venezuela, though nowhere in the Americas do the prevalence rates approach those of the Asian countries. The number of *known* cases in South America is about 158 000. In North America, the number of *known* cases is about 11 000, and in Central America less than a thousand. There are some 11 000 *known* cases in the Caribbean area.

Europe is on the whole free from leprosy, but endemic foci still exist in the Mediterranean area, notably in Spain (about 4000 *known* cases), Italy (about 400 *known* cases) and Malta (about 200 *known* cases). A few isolated cases exist in Finland, Iceland and other European countries.

Leprosy is endemic in many of the islands of Oceania, particularly in Fiji (more than 500 *known* cases), Papua and New Guinea (about 8000 cases), the Solomon Islands (about 1000 *known* cases), and the Hawaiian archipelago. Australia was said to have had more than 1000 cases in 1958.

The picture of leprosy that will ultimately emerge when all cases of leprosy are identified and put under treatment remains a matter for speculation, but it is clear that more epidemiological information on the disease is badly needed and that this can only be obtained through an effort of international collaboration.

LEPROSY CONTROL

For many years, antileprosy therapy was limited to the use of chaulmoogra oil and its ethyl ester. The only possibility of organizing an efficient fight against leprosy lay in the isolation of leprosy patients, and the existing facilities for such isolation, which was generally compulsory and indiscriminate and very inadequate in countries with high prevalence, made leprosy control impossible. The number of patients isolated in leprosy institutions is only about 211 900.[15] The lack of accommodation is the reason why many public health administrations, even in countries where the prevalence is high, avoid the problem, the only care for leprosy patients being provided by non-governmental organizations such as missions.

The discovery of sulfone in 1908 and the demonstration in 1937 by Fourneau et al.[16] of its effectiveness in bacterial infections radically changed the picture of leprosy control. In 1943, Faget and co-workers [17] demonstrated the efficacy of a derivative of sulfone, Promin, in leprosy therapy. From all parts of the world leprologists confirmed the efficacy of the new sulfone drugs, and in 1948 Cochrane [18] and Molesworth and others [19] demonstrated the possibility of substituting DDS (4:4′-diaminodiphenylsulfone), injected intramuscularly in suspensions of peanut oil, for the very expensive Promin. A few months afterwards Floch [20] began to administer the same drug orally. The efficacy, good tolerance, ease of administration and low price of DDS, which is able to arrest clinical lesions in a relatively short time, bring about bacteriological negativity, and diminish the infectiousness of open cases, has opened the way for effective leprosy control. Other drugs have followed in the wake of the sulfones, but their value is as yet largely unproven; they may turn out to be equally effective, alone or in combination with the sulfones.

THE ROLE OF WHO

In July 1948, the first World Health Assembly decided that the subject of leprosy should be given number six priority.[21] The Executive Board in January 1951 " noted with satisfaction that an Expert Advisory Panel on Leprosy had been set up from which an Expert Committee was to be convened in 1952 on the status of sulfone therapy, the effectiveness of the different preparations in use, their dosage, side effects and method of administration, especially as regards undernourished patients, which are the first topics to be discussed by this Committee ".[22]

Subsequent Health Assemblies discussed the promotion of leprosy control in different countries, and it was decided to send short-term consultants to advise the governments concerned on the more useful public health measures against leprosy. Finally, in 1952, a WHO Expert Committee on Leprosy formulated the general principles that should govern leprosy campaigns. The Committee divided leprosy into " open " and " closed " cases, according to whether leprosy bacilli are detectable by routine bacteriological examination or not. " Open " cases include all lepromatous and borderline cases, many of the reactional tuberculoid cases, and a small but varying percentage of others. " Closed " cases do not play any large part in the spread of the disease. This distinction between the two classes is the basis of the widely practised policy of confining segregation to " open "

[15] Doull, J. A. (1958) *Bol. Ofic. sanit. panamer.*, **45**, 494

[16] Fourneau, E. et al. (1937) *C. R. Acad. Sci. (Paris)*, **204**, 1763

[17] Faget, C. H. et al. (1943) *Publ. Hlth Rep. (Wash.)*, **58**, 1729

[18] Cochrane, R. G. (1948) *New developments in the therapy of leprosy*. In: *Proceedings of the Fourth International Congresses on Tropical Medicine and Malaria*, Washington, Vol. 1, p. 374

[19] Molesworth, B. D., Narayanaswami, P. S. & Simpson, I. A. (1949) *Int. J. Leprosy*, **17**, 197

[20] Floch, H. & Destombes, P. (1949) *Int. J. Leprosy*, **17**, 367

[21] *Off. Rec. Wld Hlth Org.*, 1948, **13**, 310

[22] *Off. Rec. Wld Hlth Org.*, 1951, **32**, 1

cases, and the Committee could find no adequate evidence to justify a departure from this policy.

Leprosy is not—the Committee insisted—a disease apart, but a general public health problem in the countries where it is endemic. Any measures which raise standards of public health are therefore likely to help in the control of leprosy, whether directed against specific infections or aimed at improving nutrition, sanitation or housing. Specific leprosy control work must be undertaken by personnel within the general framework of the health administration of a country, and the policy should be determined, not by public fears and prejudices, but by public health principles.

Treatment is most effective when given early; for this reason a dispensary system aimed at the early detection and treatment of cases is a primary and essential element in the organization of leprosy control. The type of dispensary, whether specialized or general, fixed or mobile, will depend on local circumstances. Whichever form it takes, it should not only detect and treat cases, it should also arrange for the placing of patients in suitable institutions, if the regulations in force require that they be isolated; select cases for domiciliary isolation where this is permissible and keep them under surveillance; arrange prophylactic measures for children born of leprosy patients; carry out welfare work; and promote education regarding leprosy. It should have a few beds for patients being kept for observation or treatment, or pending transfer to an institution.

Institutional isolation has failed as a control measure even when applied rigorously and on an adequate scale, but, if applied with discrimination and in combination with education and effective treatment of all the cases, it retains an important place in the fight against leprosy. Only open cases need be subjected to it. The degree of isolation, the methods of securing it, and the amount of compulsion required will naturally vary from area to area. In some countries compulsion may be impossible; in others, where leprosy is not endemic and the disease shows no tendency to spread, it may be unnecessary: notification with whatever surveillance is deemed necessary may be a sufficient addition to treatment. Nor should isolation be thought of solely in terms of leprosaria. Domiciliary isolation is suitable where the patient can be kept in separate quarters and treated locally; an asylum may be indicated for the permanently crippled patient in whom disease has died out and for whom there is no means of support outside; and segregation villages or hamlets have been built and function successfully in some countries for infectious cases from several villages, or to ensure regular treatment in countries with scattered populations. Hospitals or special hospital wards may be of value for the temporary treatment of cases needing special medical or surgical measures.

The Committee discussed methods of treatment, the possibility of prophylaxis by BCG vaccination, and the immunology of leprosy. Mass campaigns, it felt, should be organized in limited areas.

Following the recommendations of the Expert Committee on Leprosy, WHO has continued and intensified its policy of helping countries in which leprosy is endemic. It encourages the study of local patterns of leprosy with the help of short-term consultants whom it sends out to help advise the government concerned. Consultants have up to now visited the following countries and territories:

Africa : Belgian Congo, French Cameroons, the former French Equatorial and French West Africa, Gambia, Ghana, Kenya, Madagascar, Nigeria (Eastern, Northern and Western), the Portuguese territories of Angola, New Guinea and Mozambique, Tanganyika and Uganda.

Americas : Bolivia, Colombia, Ecuador, Grenada, Guadeloupe, Guatemala, Guiana, Martinique, Paraguay, Peru, St Lucia, Trinidad.

Eastern Mediterranean : Ethiopia, Iran, Iraq, Pakistan and the Sudan.

Europe : Turkey.

South-East Asia : Burma, Ceylon, Indonesia, Thailand.

Western Pacific : Cambodia, China (Taiwan), Korea, Philippines, Solomon Islands.

TABLE 2. WHO FELLOWSHIPS IN LEPROSY

Region	1950	1951	1952	1953	1954	1955	1956	1957	1958	Total
Africa										
Belgian Congo	—	—	—	—	1	—	1	—	—	2
French Equatorial Africa	—	—	—	—	—	—	—	1	—	1
French West Africa	—	—	—	—	—	—	—	1	2	3
Gambia	—	—	—	—	—	—	1	—	—	1
Nigeria	—	—	—	—	—	—	1	—	—	1
Portuguese territories	—	—	—	—	—	—	1	2	—	3
Rhodesia and Nyasaland	—	—	—	—	1	—	—	—	—	1
Americas										
Brazil	—	1	—	—	—	—	—	—	—	1
Ecuador	—	—	1	—	—	—	—	—	—	1
Jamaica	—	—	—	—	—	—	—	—	4	4
Mexico	—	—	1	—	—	—	—	—	—	1
Paraguay	—	—	—	—	—	—	3	5	—	8
Trinidad	—	—	—	—	—	—	1	—	—	1
South-East Asia										
Burma	—	—	—	1	—	1	—	1	1	4
Ceylon	—	—	—	—	—	—	1	1	1	3
India	1	—	—	—	—	—	—	2	1	4
Indonesia	—	—	—	1	—	—	—	—	—	1
Thailand	—	—	—	1	—	1	—	—	2	4
Europe										
Portugal	—	—	—	—	—	—	—	2	—	2
Turkey	—	—	—	—	—	—	—	1	—	1
Eastern Mediterranean										
Iran	—	—	—	—	—	—	—	—	1	1
Lebanon	—	—	—	—	1	—	—	—	—	1
Western Pacific										
Korea	—	—	—	—	—	1	—	1	1	3
Papua	—	—	—	—	—	—	—	—	1	1
Philippines	—	—	—	—	—	—	—	—	1	1
Total	1	1	2	3	3	3	9	17	15	54

WHO seeks to improve local staff engaged in the leprosy campaigns by means of fellowships (see Table 2). It promotes the development of local campaigns with the economic support of UNICEF, WHO giving technical advice, or, in certain countries, e.g., Burma, Ceylon, Indonesia and Thailand, collaborating directly by means of a WHO Senior Leprologist.

WHO re-examined its policy on leprosy control in December 1957, when an informal study group met in Geneva to review the recommendations in the first report of the WHO Expert Committee on Leprosy in the light of advances in leprology and the experience gained in five years of widespread mass leprosy campaigns.

In 1958, WHO policy in regard to leprosy control was laid down in a guide for those working in antileprosy campaigns.[23] The fundamental purpose of any leprosy control campaign, according to the guide, is to render open cases non-infectious, thus preventing the development of new cases and bringing about a progressive reduction in endemicity. The most important steps in the campaign are the early detection of all leprosy cases, regular treatment of all registered patients, protection of contacts against contagion, and rehabilitation of cured persons.

The case-finding control programme, the different measures to be adopted in countries of high, medium, and low endemicity, the various schedules for treatment, the criteria of arrest, the follow-up of cured cases, and the criteria for discharge are carefully described in the guide.

In many countries, experience has shown that a pilot project in a limited area is the best way to start a campaign. The teaching and training of campaign personnel can be begun in such a project, and extension of the campaign to an increasingly wider area can be undertaken when funds and personnel permit.

The administration of the leprosy campaign, the teaching and training of personnel, and the assessment of results of leprosy control are also carefully described. Special emphasis is laid on health education, not only of the general public, but also of doctors, health personnel, and patients. It is necessary in all such education to emphasize that leprosy is a curable disease, that deformity can be avoided by prompt treatment in the early stages of the disease, and that there are certain irreversible sequelae of some forms of leprosy which should not be interpreted to mean that the disease is not arrested or cured.

1958 was a very important year for WHO in the development of leprosy control. Following its policy to give help and advice to countries with high endemicity and limited resources, WHO established a leprosy unit at Headquarters to co-ordinate its work on leprosy throughout the world.

Regional and inter-regional meetings were organized to unify policy on leprosy control and to spread knowledge among the local staff of the countries interested in this problem. A leprosy advisory team, composed of a leprologist (the team leader) and a statistician, was established to assess the results of the leprosy campaigns in progress.

A UNICEF/WHO Joint Committee on Health Policy met in October 1958 to review leprosy control activities. Very satisfactory progress, it noted, had been made in 13 leprosy control projects jointly assisted by UNICEF and WHO: thereby confirming not only the effectiveness of the methods used (methods based essentially on medication with DDS) but also the possibility of organizing on a large scale both the detection and systematic recording of new cases and the mass treatment of known cases, so as to ensure regularity, and consequently effectiveness, of treatment, even in the most remote territories.

For the successful future development of projects receiving international assistance certain conditions must be fulfilled. The legislation of the country must be in accordance with the principles of WHO, international aid being given only to countries ready to use large-scale modern methods in the fight against leprosy. Every project should be preceded by a survey of local

[23] Mimeographed document MHO/PA/48.59

conditions made by a WHO expert so as to enable him to draw up a plan of operations in agreement with the government health authorities. Projects should be long-term, and the period during which international assistance is given not less than five years. In many countries, it is necessary for a WHO expert to assist for at least two years in establishing the project, and he may possibly have to continue his collaboration during its expansion. If there is no resident WHO expert, a visit lasting a few weeks should be made at least every two years by a WHO consultant in order to follow up operations and make any modifications necessary in the plan. In countries with insufficiently developed health services, pilot projects or demonstration areas are the most suitable way of beginning the campaign.

Seminar on leprosy control

A seminar on leprosy control in the Americas had been held in Belo Horizonte, Brazil, a little earlier, in June and July 1958, under the auspices of the Government of Brazil, PASB, and WHO.[24] Its purpose was to enable the participants to exchange views on leprosy control and to discuss ways and means of attacking the problem in the Americas. Data—the participants agreed—are essential in any plan of control; for the countries concerned, however, not only are they scanty, but they also lack uniformity and system. Consequently it is difficult, if not impossible, to compare the situation in different countries, or even the situation in the same country at different times. There is an obvious need for an overhaul of statistical services and methods, and in particular for the adoption of the grouping by age used in WHO statistics.

Leprosy control services are to be found at all stages of development in the Americas. On the whole, they are poorly balanced, and few of them are aware of the magnitude of the problem with which they are faced; nor are they properly integrated with the general public health services, or staffed with specially trained men. As a result, control programmes are as a rule inadequately carried out. Nearly everywhere too much stress is laid on the isolation of patients; indeed, in some areas this is the sole measure of control employed. The legislation too in general dates back to before modern ideas on leprosy, and is too restrictive in character; in some areas, by contrast, however, there is no legislation at all.

Isolation in special leprosaria—the participants in the seminar were agreed—as a method of leprosy control suffers from serious disadvantages. It leads to the concealment of cases because of the fear of compulsory confinement it engenders. It involves heavy expenditure on the leprosaria that could better be devoted to more rational methods. It casts a stigma upon, and leads to the disintegration of, the patient's family, making social readjustment more difficult. It discriminates unjustly and inhumanly against one class of ill persons, with the effect of making them appear to be outcasts and rendering their rehabilitation into society impossible or next to impossible. And it perpetuates popular prejudices against leprosy. It should therefore be abolished, hospitalization in special institutions being restricted to cases where there is some special social or medical indication. In its stead there should be effective control of foci of infection through treatment of all sufferers from the disease and close surveillance of contacts.

Mass treatment is only feasible where the whole population or thereabouts can be regarded as contacts, and is consequently not a method of control that is applicable in the Americas. The seminar preferred what it called extensive ambulatory treatment, meaning thereby out-patient treatment of all known patients with the aim of rendering them bacteriologically negative in the minimum time, so progressively reducing the opportunities for spread of the disease. This treatment depends on the existence of drugs of known action and tolerance, and requires for its success that all available resources be employed, especially in the rural areas, to ensure that no focus of infection is left and no patient untreated. Such a programme will

[24] *Bol. Ofic. sanit. panamer.*, 1958, 45, 545

need the full support of the authorities, as it must, given the characteristics of leprosy, be a long-term one; and it must be flexible and adapted to the country in which it is carried out.

Direct contacts should be subject to constant surveillance, and placed under treatment the moment they are found to have contracted the disease. The new-born should be kept away from foci of infection, in children's homes or the like. There is no need for special institutions for the care of dependants of those found to be infected, as isolation should be abolished. On the question of chemoprophylaxis for contacts the seminar was divided, there being in its view insufficient evidence for a definitive opinion: some participants thought chemoprophylaxis necessary for those persons who had been in contact with open cases; others felt that proper trials should precede the introduction of any such measure.

The seminar recognized the importance of increasing resistance to leprosy, although there was no unanimity of opinion about the value of the methods used, such as BCG vaccination and lepromin. One view about BCG was that it should be employed, although years would be required before any definitive opinion could be expressed on its merits or demerits, because of its value in tuberculosis and its possible stimulating powers on the body's defences against leprosy. Another view was that there was no justification for using BCG until its value was demonstrated. All were agreed that its use deserved, and should be given, further study.

Should the staff engaged on leprosy control form part of the public health services or be a separate body? The seminar agreed that the former was the better solution: amalgamation increased the scope and vigour of the programme, reduced costs, and facilitated co-ordination with other public health activities. Those who were in charge of the leprosy campaign should be properly trained; special training courses should be launched for the subordinate staff; and the very important psychological aspect should be given due emphasis. Leprology should receive increased attention in the medical schools, closer contact being desirable between the leprosy services and the departments of skin diseases, preventive medicine and neurology. Institutions, both public and private, should support and encourage research into leprosy. Health education is an integral part of any programme for the control of disease; its importance in leprosy needs no stressing. Legislation on leprosy should be included in the general legislation on communicable diseases, not enacted separately and given undue prominence. All co-operation by private organizations in the task of control would be welcome.

Inter-Regional Leprosy Conference at Tokyo

A WHO Inter-Regional Leprosy Conference was held in Tokyo in November 1958.[25] It was attended by participants from the South-East Asia, Eastern Mediterranean, and Western Pacific Regions, as well as by representatives of eleven non-governmental organizations.

In any country with a leprosy problem, the Conference agreed, a preliminary investigation and a pilot case-finding and treatment programme are necessary, the latter normally being started in a demarcated area. An epidemiological survey requires adequate expert staff and other facilities, and it was suggested that countries might wish WHO to assist in conducting such a survey. Bacteriological examination should be carried out on every leprosy case where practicable. Doubtful cases should be examined further by qualified personnel, but treatment should not be withheld pending confirmation of the diagnosis. Each country should revise its classification of leprosy in accordance with the principles laid down at the Seventh International Congress on Leprology, held in Tokyo just before the Conference.

The Conference agreed with most of the views of the South American seminar on leprosy control about the organization of leprosy control services, but felt that, while progressive and complete integration into the general public health services was desirable as an ultimate aim, a special service

[25] Unpublished report WHO/Lep.Conf./21

was needed in the early stages, attached to the directorate of health services. A minority also expressed the opinion that, in certain stages of leprosy control and in special circumstances, some form of specific legislation might be found necessary.

The Conference discussed principles of treatment. In mass leprosy control campaigns an inexpensive form of therapy must be used which can be administered safely by auxiliary personnel. At present, the only drug which fulfils these requirements is DDS, given orally or by repository injection. The choice of the mode of administration will depend on local circumstances, either mode having its advantages and disadvantages but both being equally effective. Treatment must be taken to the patient, mobile teams being useful for this purpose. Only if patients prove to be intolerant of, or resistant to, DDS is there any justification for special drugs, and then they should be administered under close medical supervision, preferably in an institution. The Conference recognized the need for research directed towards finding more effective drugs, of better tolerance and longer repository effect.

The length of treatment depends on a decision as to when an active and therefore dangerous case becomes inactive. The Conference agreed on certain criteria by which inactivity might be judged. No bacilli should be found over a period of at least six months by routine methods of examination in smears from the skin and nasal mucosa. There should be no visible infiltration of the lesions, i.e., all lesions should have become flat for at least six months. No alteration of texture or colour should have occurred in the lesions and no erythema should have appeared for the same period. No fresh lesions or extension of existing lesions should have taken place. Anaesthesia should similarly have remained stationary, and there should have been no nerve tenderness or pain for a period of six months. The Conference recommended that treatment of indeterminate or tuberculoid (including maculo-anaesthetic and neuritic) cases should go on for two years, or until all signs of activity have ceased for eighteen months, whichever is longer. Treatment of lepromatous and border-line (dimorphous) cases should go on for at least two years after all signs of activity have ceased.

The Conference endorsed the conclusions of the seminar on the undesirability of isolating leprosy patients. Institutions can play an important part in control programmes by providing facilities for treatment of patients in reaction and infectious patients admitted on a voluntary basis, and they may be centres of research, education, special surgery, and vocational training. Patients with acute complications or incidental illnesses should otherwise be treated in general hospitals.

On other aspects of prevention, too, the Conference was in accord with the seminar. The role of BCG is as yet not established, and chemoprophylaxis for contacts has still to be proved to be of value; further research is therefore advisable. One point in prevention cannot be over-emphasized in any leprosy campaign: the danger of open cases coming into intimate contact with healthy members of the community, particularly children.

Shortage of specialized medical staff should not deter health administrations from carrying out leprosy control work, which is usually largely done by trained auxiliary personnel. The director of a programme should, however, be versed both in public health and in leprology. The study of leprology should be linked with other scientific disciplines, and the basic research worker should be encouraged to take an interest in its problems. Medical practitioners and students ought to learn more about leprosy, tuition during the student years and refresher courses afterwards being valuable.

Knowledge about the main facts of leprosy should be as widely diffused as possible, and propaganda should — the Conference stressed—be directed not only at the general public but at doctors, health workers and patients. There should be no hesitation in stating that leprosy is a curable disease, and it should be emphasized that early treatment may prevent deformity, which is itself usually correctable. In this

way, the fear of leprosy, which is rooted in the idea that it is incurable and in its association with deformity, will be allayed, and leprosy patients will no longer be regarded with loathing and dread.

The Conference also discussed the assessment of the results of leprosy control, favouring the evaluation indices suggested at the Seventh International Congress on Leprology; and dealt finally with the important subject of the social, physical, and psychological rehabilitation of leprosy patients. It is particularly necessary to convince the public that leprosy is not a disease apart, and that patients can be accepted and rehabilitated within the community. Deformities that cannot or have not been prevented can be improved or corrected by physiotherapy in conjunction with orthopaedic and plastic surgery. For this purpose, each country should have at least one centre where specialists can provide teaching facilities and consultant services for surgeons and physiotherapists in the area. Surgical services can be attached to the general hospitals and leprosy centres, the essential requirement being that the surgeon should have received special training and that he should be aided by auxiliary personnel who can prepare the cases and follow them up. Occupational facilities should be provided.

CCTA/WHO Leprosy Conference in Africa

A Leprosy Conference was held in Brazzaville in April 1959 under the joint auspices of WHO and the Commission for Technical Co-operation in Africa south of the Sahara (CCTA).[26] In the view of the Conference DDS is the drug of choice in mass treatment, because it is well tolerated, effective and cheap. The question of whether it should be administered by injection or in tablet form depends on local geographical conditions, the health services, the qualifications of the staff giving the treatment, the financial situation of the country, and social and psychological factors. The discovery of new preparations may, however, affect the choice, dosage and periodicity of treatment. If tablets of DDS are used, they should as far as possible be swallowed in the presence of the distributor. A standard form of mass treatment is desirable for campaigns in Africa, and should only be departed from in cases found to be resistant to, or intolerant of, DDS. The Conference accepted the criteria formulated by the Tokyo Conference for the determination of inactive cases, and endorsed the schedule of treatment based on those criteria.

The teaching of leprology is of particular importance in Africa, and African medical students should all learn about a disease which presents many urgent problems in their continent. It should be taught chiefly in courses of dermatology, but full attention should be paid to the neuropathies and the public health and social medicine aspects. At present a period spent in practical work would be more useful in dealing with the problems of leprosy in Africa than time spent on a specialist degree in the subject; for the Conference was well aware of the difficulties in getting doctors to specialize in leprology. Careful training is required for the paramedical personnel as well as for the medical personnel, and laboratory technicians, qualified physiotherapists, and occupational therapists are essential members of any leprosy control team.

In each African country, the Conference felt, there should be a special leprosy service, directed by a qualified leprologist with adequate training and experience in health administration. Before a campaign is launched a propaganda drive should prepare the population for the methods to be used and convince them of the importance of bringing leprosy under control. A preliminary survey is needed to assess the extent of the disease, the size of the staff and the amount of equipment and supplies required. A country which has not yet got an adequate health service should first establish a minimum service, without which no campaign undertaken with international assistance can be satisfactorily carried out, even in a small area. The decision whether a campaign should be general or limited depends on the

[26] Unpublished document CCTA/WHO/Lep. Conf./16, Rev. 2

Leprosy in History

The word "leper" comes from a Greek word ing "scaly"; in one form or an other this word is found ghout the Aryan languages, with the same meaning mething peeling off. In ancient Greece the term was y used to mean psoriasis. Elsewhere, in India and pt, as well as in the Israel of the Bible, it is uncertain far it was used to mean leprosy in the modern sense, far other skin diseases characterized by scaling. ical descriptions corresponding to the disease as n at present do not appear before the Middle Ages Europe or the seventh century in China.

Even in the nineteenth century the greatest confusion ted about leprosy. Medical dictionaries in France, xample, would refer their readers to the article on antiasis for a history of the disease, and point out the term leprosy had been applied to pellagra, the antiasis of the Greeks and the elephantiasis of the Arabs, and, in the sixteenth century, to syphilis, this being ded as a degeneration or a modification of the disease as known up to that time. The description of leprosy in dictionaries is generally found under "elephantiasis", the article under "leprosy" being devoted only to the past ings of the word.

Leper confessing. The priest holds a handkerchief over his mouth to avoid contagion. XVth century.

← Physicians examining lepers in leper house. Early XVIth century.

Rattles (open on the left, closed on the right) used by lepers in mediaeval Germany.

Woodcut of 1493 commemorating Maundy Thursday in Nuremberg, the day annually set aside for hospitality to lepers.

* *Leprosy is the perfect ample of the disease inspires an irrational fear arouses a feeling of guilt. ambivalent attitude is a bottom of medieval treatme the leper. He was general outcast, dead to the world, gated in a lazar house, or s secluded at home by his rela In the twelfth century, ho an outburst of sympath "Christ's Poor", encourag the Church, led to noble washing the feet of leper embracing their diseased Leper or lazar houses were co foundations in the Middle and this has provided one arguments for the thesis leprosy was then widespread. many of these foundations ex only in name; chronic ski eases were indiscriminately together as leprosy and suffering from them confin leper houses; beggars and pa often sought and found a in them; and not a few rem empty or nearly so. The valence of true leprosy therefore be readily deduced the number of such leper although other sources in that the disease was relatively mon throughout the Middle*

* *Leprosy probably reach peak in Europe between 1000 and A.D. 1400, ther declining till it died out in European countries in the teenth century or a little Whether this was due t measures taken against disease, to the general imp ment in hygiene, or to the na subsidence of a centuries-old epidemic, it is hard to say. One interesting, but unproved, theory attributes the decline in l to the increase in tuberculosis,* Mycobacterium tuberculosis *shouldering out its less hardy relative* Mycobacte leprae. *But the opening up of other parts of the world showed that if leprosy was a dying disease in Europe it w from being so in Africa, in South-East Asia, or in Central and South America.*

* *The modern history of leprosy may be summed up in a few words. The causative organism was discovered in and the disease was realized to be a communicable one like many others, and a great deal less infectious than many introduction of chaulmoogra oil in 1854 and of the sulfones in 1941 has made it a curable disease. And finall disfigurements and deformities which were once regarded as an inevitable concomitant of leprosy have come to be preventable, or, in many cases, correctable by surgery.*

The woodcuts and the photograph used to illustrate this text on leprosy in history have been kindly made available by Ciba, Basle, Switzerland.

health service staff already available; if a pilot project is decided upon, training of staff can go on concurrently, and the pilot project can afterwards be used as a demonstration area. In a country with a high prevalence rate, favourable geographical conditions, and sufficient funds, mobile teams will secure more regular attendance for treatment than fixed centres, and they complement outpatient clinics, especially when these are few. Leprosaria have now lost their *raison d'être*, but should be kept for specialized treatment where this is necessary. The development of ambulatory treatment should not be regarded as a reason for reducing or withdrawing aid to these institutions. In addition to the leprosaria, all the hospital units in the country are needed for the treatment of acute cases, i.e., those suffering from reactions or intercurrent illness.

Leprosy work should be integrated into general health work, but integration cannot start without an adequate rural health unit coverage. Case-finding will still have to be carried out for a long time by mobile survey teams, who should take advantage of all mass examinations of the population as, for example, during yaws campaigns. Limited zones should be established for the evaluation of the results of the leprosy campaigns, suitable evaluation indices being those adopted by the Seventh International Congress on Leprology. Among the problems to be settled in any campaign is the important one of co-ordination between neighbouring countries in the treatment of migrant patients and exchange of information on seasonal movements of population.

The Conference was in full agreement with the Tokyo Conference's views on the serious disadvantages of compulsory segregation of leprosy patients. Voluntary isolation of contagious cases is, however, a useful measure to be recommended and encouraged. Legislation on communicable diseases can be supplemented by special orders on leprosy measures. In particular, governments should empower doctors to recommend that infectious patients under their care should not follow certain occupations, such as those of midwife, nurse, or teacher. Laws should be reviewed in the light of present knowledge of leprosy, and those retained applied liberally. One compulsory requirement is desirable: the whole population of an area should be required to attend during survey visits—visits which are in any case justified by the existence of concomitant endemic diseases.

Separation of children from their leprous parents is not a feasible measure in Africa, both because of the lack of suitable institutions and because a high rate of infant mortality tends to result; moreover, the psychological effects are often disastrous. In leprosaria they should be separated for the night only from their lepromatous mothers. Breast-feeding should not be interrupted; chemoprophylaxis for infants should begin only when the infants are weaned, as the milk of mothers on sulfones may be sufficient to protect while the babies are still at the breast.

The Conference prepared a classification of disabilities in leprosy, and discussed the organization of physiotherapy and occupational therapy, prevention of disabilities, orthopaedic and surgical rehabilitation, and the reintegration of leprosy patients into social life in the special conditions obtaining in Africa. More attention should be paid to establishing departments of rehabilitation in leprosaria.

Expert Committee on Leprosy (1959)

A WHO Expert Committee on Leprosy met in Geneva in August 1959, and discussed various problems that had arisen in the leprosy campaigns.[27]

Lepromatous patients are generally agreed to be the most infectious. But the high prevalence rate of leprosy combined with a nevertheless low prevalence rate of lepromatous cases in certain countries cannot be explained on the assumption that lepromatous cases are the only sources of infection. Evidently the borderline group, the reactional tuberculoid and some indeterminate cases are to some degree infectious. The evidence suggests that tuberculoid cases are not normally infectious, but the Committee's

[27] *Wld Hlth Org. techn. Rep. Ser.*, 1960, **189** (In preparation)

view was that all non-lepromatous patients should be subjected to a careful bacteriological examination.

The lepromin reaction is of established value as a test of individual reactivity to the *Myco. leprae*; it furnishes a criterion for the classification of cases and an indication of the prognosis in patients and of relative resistance in contacts. Several problems are raised by the need for standardization for the reaction. The lack of specificity of terminology causes much confusion, lepromins, bacillary lepromins, leprolins and Dharmendra antigens all being mentioned in the literature. The Committee sought to clarify the situation, and made recommendations about purification of the antigens, standardization for the Mitsuda reaction and the reading of the reactions.

While the methods to be adopted for anti-leprosy campaigns will differ according to the prevalence and the economic and social conditions of each country, wherever a campaign is started it is essential to establish a central leprosy service directed by a leprologist with knowledge of public health administration. Ultimately, however, the leprosy service should be integrated within the general health services. The campaign need not await the arrival of highly qualified personnel, but can be started with a limited paramedical staff and extended as more personnel is recruited.

Leprosy campaigns usually have three phases; attack, consolidation and integration. The attack phase is one of case-finding and treatment, case-finding being carried out by mass examination, house-to-house visiting, contact tracing, or the examination of previously selected groups of the population, according to the situation in the country. Case-holding is the most important part of the consolidation phase, as leprosy is a chronic disease and patients have to be treated for years. This may be achieved by mobile circuits, out-patient clinics, skin clinics (fixed or mobile), leprosy villages, survey, health education and treatment (SET) units working in the neighbourhood of a general hospital, dispensary or health centre, or working groups of the kind established in Brazil, directed by a leprologist who supervises the work of non-specialist physicians and health workers. In the integration phase health centres assume the responsibility of treating leprosy cases. At first the specialized leprosy staff looks after case-finding and re-surveys, but when integration is complete this work is done by the general health services.

Pilot areas should be established to evaluate results in countries where the campaigns cover the whole of the territory. In others they are the only effective way of starting campaigns, the pilot projects being extended gradually.

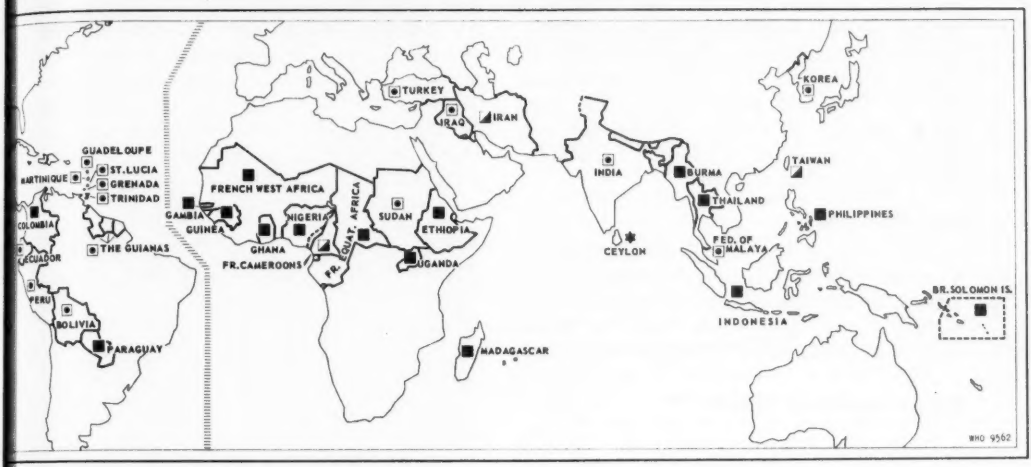
On the subject of BCG vaccination, the Committee agreed that this might be of benefit to healthy contacts. Although its efficacy in the prevention of leprosy has not been conclusively proved, because most of the experiments have been on too small a scale and done without proper statistical support, and many have been done too recently to permit assessment of the results, there is no objection to the use of BCG vaccination in leprosy campaigns in countries with the resources to carry it out. The Committee suggested a number of investigations that could be carried out to test the effectiveness of BCG in leprosy control, particularly in conjunction with the tuberculosis investigations in India.

SOME INTERNATIONAL LEPROSY PROJECTS IN PROGRESS

On the recommendation of the UNICEF/WHO Joint Committee on Health Policy in May 1953, leprosy was included among the diseases for which the two international agencies could provide joint assistance to countries.

Direct assistance by WHO had already started with the provision of consultants to Burma and Ceylon in 1951 and to Ethiopia in 1952, to co-operate with the health authorities in preliminary surveys of the leprosy situation and in the planning of leprosy programmes. Joint programmes with UNICEF, some of which are described below, followed a little later, the principle on which

WHO/UNICEF LEPROSY PROJECTS, 1959



Projects : ✱ *completed* ■ *in operation* ◪ *in planning stage* ◙ *in preliminary survey stage*

collaboration between the two agencies is based being that UNICEF, under its agreement with governments, furnishes the supplies required, while WHO studies and approves all plans of programmes for which countries request supplies from UNICEF. WHO is also responsible for sending health experts at the request of governments to help draw up plans of operation for health programmes.

Nigeria

The Nigerian leprosy campaign is one of the oldest leprosy campaigns in Africa. International assistance started with the visit of a WHO consultant in 1952, who estimated that the number of cases in the country was 600 000.

In 1953 the Nigerian Government requested WHO for advice on leprosy control and for fellowships in this field. In 1954 the first plan of operations was signed by the Nigerian Government, WHO, and UNICEF, the main objective being to bring about 100 000 leprosy patients under treatment in a three-year period.

In the following year the political evolution in Nigeria caused some modification in the first plan of operations, and new plans were drawn up for the three territories of Eastern, Northern and Western Nigeria.

Eastern Nigeria.

The leprosy campaign began in Eastern Nigeria in 1947 with the segregation of contagious leprosy cases and the creation of 31 out-patient clinics for ambulatory treatment of " closed " cases; in that year the number of treated patients reached the figure of 13 809.

The total number of registered patients rose in 1958 to 36 540; the number of patients hospitalized and discharged since the beginning of the campaign is over 16 600. In the last quarterly report received for 1959, emphasis was laid on the fact that between 1939 and 1959, there had been a reduction in the leprosy prevalence in the Owerri Province from 50 per 1000 to 2 per 1000.

Northern Nigeria

One of the most spectacular mass campaigns against leprosy has been launched in Northern Nigeria. The campaign began in

1952 with the treatment of about 17 000 patients. In January 1959, the number of treated patients reached the figure of 179 837. Only 6000 patients are isolated in institutions. This campaign has been carried out by paramedical personnel supervised by the campaign director (a medical officer) and the general practitioners in charge of the different divisions and districts.

Western Nigeria

The progress of the leprosy campaign in Western Nigeria is not so spectacular. In December 1957 the number of patients under treatment was only 8904, and, of these, 3027 were isolated in different institutions.

French Equatorial Africa [28]

A leprosy campaign began in 1953 in French Equatorial Africa. In 1955, the French Government requested international assistance, and, with the technical advice of WHO and important supplies from UNICEF, 193 mobile circuits were organized to cover the whole area.

The estimated number of cases in this area is 150 000, and the progress of the leprosy campaign can be seen from the following table:

Year	*Registered patients*	*Patients under treatment*
1953	54 652	5 988
1954	93 045	76 830
1955	120 008	80 130
1956	136 150	113 440
1957	140 414	121 542
1958	145 827	—

French West Africa [28]

The leprosy campaign in French West Africa is one of the biggest in the world. International assistance by WHO and UNICEF began in 1955, and a plan of operations was signed by the Government, WHO and UNICEF in September 1957.

As in French Equatorial Africa, the campaign is carried out by mobile circuits of which about 300 have been established. All existing leprosy centres in the area have been used for the campaign. Progress in the discovery of new cases has been spectacular, but the provision of regular treatment for registered patients has lagged behind because of political developments, and only about 50% of the patients can be given regular treatment. The progress of the campaign can be seen from the following table:

Year	*Registered patients*	*Patients under treatment*
1950	103 613	34 080
1951	118 823	46 000
1952	150 377	52 773
1953	175 586	81 422
1954	201 279	103 369
1955	232 917	127 077
1956	283 012	124 000
1957	293 000	122 687
1958	304 865	162 142

The estimated number of cases in the area is 500 000.

Ghana

The Government of Ghana started the leprosy campaign without international assistance and made remarkable progress. In 1957 a plan of operations was signed by the Government, WHO and UNICEF, WHO providing consultants and UNICEF important supplies, drugs and transport. In 1952, the number of treated patients was only 5592, but by the end of 1958 26 017 patients were under treatment. About 12 000 patients have been taken into institutions, discharged and followed up.

Uganda

International assistance to the Uganda leprosy campaign began in April 1956. The establishment of the campaign involved very special measures, in view of the scattered population in Uganda. As it was impossible to establish regular mobile circuits, a large part of the leprosy patients were concentrated in settlements to ensure regularity of treatment and supervision. The number of registered patients in the territory is 50 000,

[28] This area still existed as a political entity when the leprosy campaign was started.

DIFFERENTIAL DIAGNOSIS OF LEPROSY

1

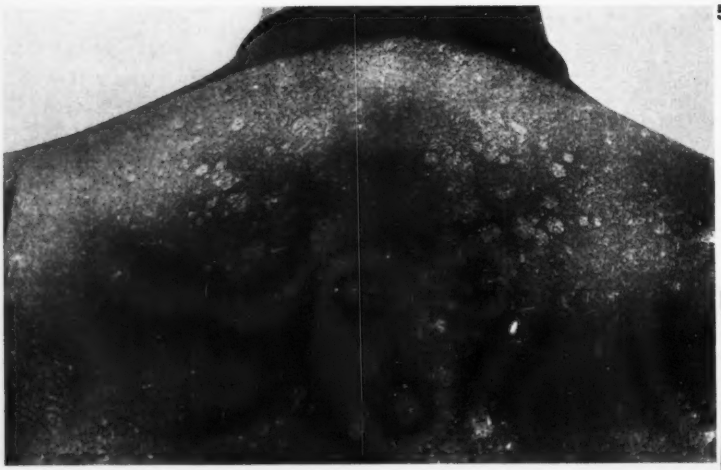
2

The diagnosis of leprosy is generally easy, especially when it is sufficiently advanced for deformities to be present. The typical leonine facies of advanced lepromatous leprosy **(1)** is known even to some non-medical people, and workers in the field should recognize easily the plaques of tuberculoid leprosy **(2)** and the hypopigmented macules of indeterminate leprosy **(3)**. The more difficult succulent "border-line" lesions **(4)** are usually diagnosed without difficulty because of the presence of anaesthesia and of *Mycobacterium leprae* in smears from the skin lesions.

Nevertheless, the diagnosis may be difficult. Flat hypopigmented indeterminate macules are often confused with pityriasis alba faciae, which is characterized by small hypochromic patches on the face, and is very common in children. It is also possible to confuse indeterminate leprosy macules with different kinds of epidermomycosis, e.g.,

3

pityriasis versicolor **(5)** or ringworm **(6)**. These diseases are common where leprosy is common, and often co-exist with it. The lesions of mycosis, however, very often have blistering edges and surface desquamation, whereas those of leprosy have a smooth surface and no blisters; and the former show special preference for the hairy skin, which is not commonly affected in leprosy. Anaesthesia is pathognomonic of leprosy; there is never any in mycosis. In doubtful cases anhidrosis may be detected by the iontophoresis apparatus with pilocarpine or acetylcholine.



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Leprosy macules may be confused with certain hypopigmented macular lesions of yaws **(7)**. The differentiation is important because the diseases co-exist in many countries; in some cases the onset of leprosy follows yaws. The presence of anaesthesia or anhidrosis establishes the disease as leprosy. In yaws there is commonly desquamation from the surface of the macules.

The changes of pigmentation of certain nutritional diseases (pellagra and other avitaminoses) or parasite diseases (onchocerciasis) may resemble indeterminate leprosy.

Tuberculoid leprosy may also be simulated by the epidermomycoses. The patient in **8** was diagnosed as having leprosy, but the presence of similar patches in the armpits **(9)** showed the diagnosis to be ringworm. Certain forms of skin tuberculosis, such as lupus vulgaris, may also resemble tuberculoid leprosy. So too cutaneous paratuberculosis, e.g., lymphogranuloma benignum, especially the so-called nodular sarcoid, may closely resemble certain forms of

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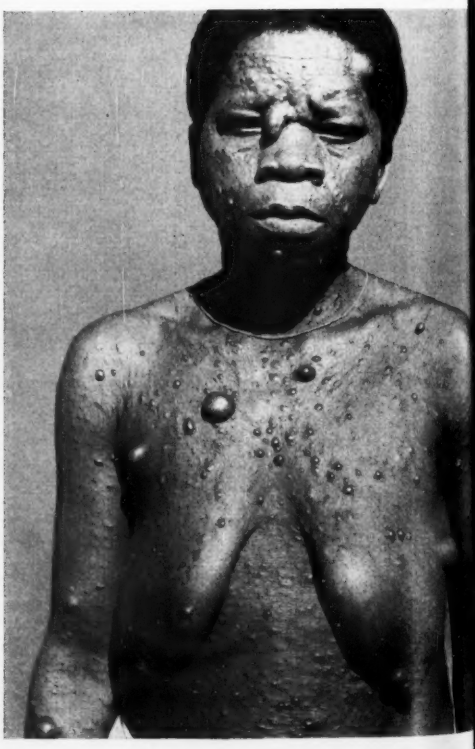
reactional tuberculoid leprosy **(10)**. This resemblance is not limited to the morphology of the skin lesions; in lymphogranuloma benignum absorption of the bone occurs, in a way very similar radiologically to that of leprosy, and the histological structure in both diseases is often indistinguishable. Here again the important diagnostic point is the presence of anaesthesia or the other neurological signs and symptoms almost always present in leprosy but not in sarcoid.

Some lesions of early yaws occasionally resemble tuberculoid leprosy; the lower lesions in **11** do, while the upper ones resemble syphilis. Anaesthesia and thickening of the ulnar nerves confirmed the diagnosis as leprosy, however. The presence of these neurological signs and symptoms serves to distinguish leprosy from certain forms of chronic lupus erythematosus (mainly the facial variety), the histological picture in both diseases being at times confusingly similar. Superficially the diagnosis may not be easy between the leprosy of **12** and lupus erythematosus.

Lepromatous leprosy is the most characteristic form of the disease, the easiest to recognize, and the most unlikely to be confused with other diseases. But mistakes are not uncommon. The patient in **13** was in a leprosarium for months before she was found to have, not leprosy, but multiple neurofibromatosis (von Recklinghausen's disease), which may resemble some forms of lepromatous leprosy **(14)** but does not have typical signs such as alopecia of the eyebrows. Bacteriological examination would have given the correct diagnosis immediately, as abundant bacteria are always found in lepromatous leprosy. Late yaws **(15)**, at first sight not unlike lepromatous leprosy, can similarly be distinguished. Certain lesions of early yaws, such as the nodular variety found on the knees **(16)**, resemble lepromas, which also are often on the knees **(17)**. At this stage of leprosy there are usually other cutaneous or neurological manifestations, however, and bacteria can be found in the lesions. As in tropical



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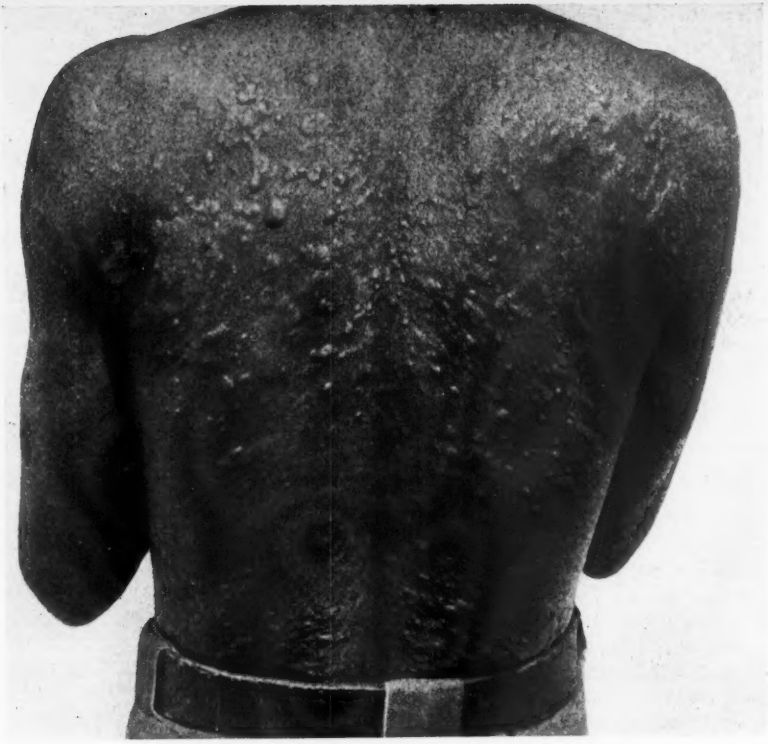

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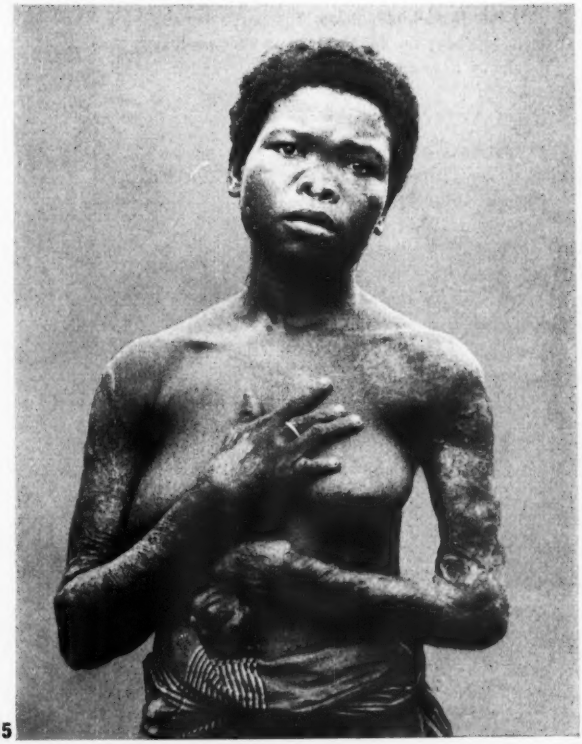
countries it is relatively frequent for leprosy and yaws to occur together in the same patient, it is possible for the wrong type of leprosy to be diagnosed, especially in patients with gangosa, a lesion of the nasal bones characteristic of late yaws **(18)**, but resembling in some ways the typical nasal lesion of lepromatous leprosy. In yaws, however, the lesions are in the bones, and the bony palate is frequently involved. In lepromatous leprosy the lesions are in the cartilaginous septum and the palate is not involved, or, if it is, only the soft palate is. In advanced cases the nose generally has a very peculiar tribolate feline appearance **(19)**, quite different from that of yaws. A bacteriological examination will clinch the diagnosis if laboratory facilities are available, and the lepromin test, which is negative in lepromatous leprosy, may be helpful. It is not rare to confuse lepromas with onchocerciasis nodules, but these are located principally on the iliac crest, and bacterio-



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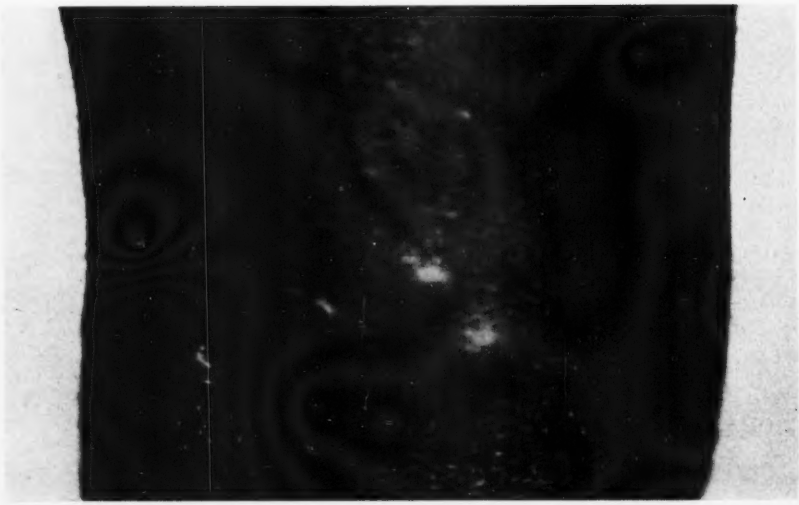
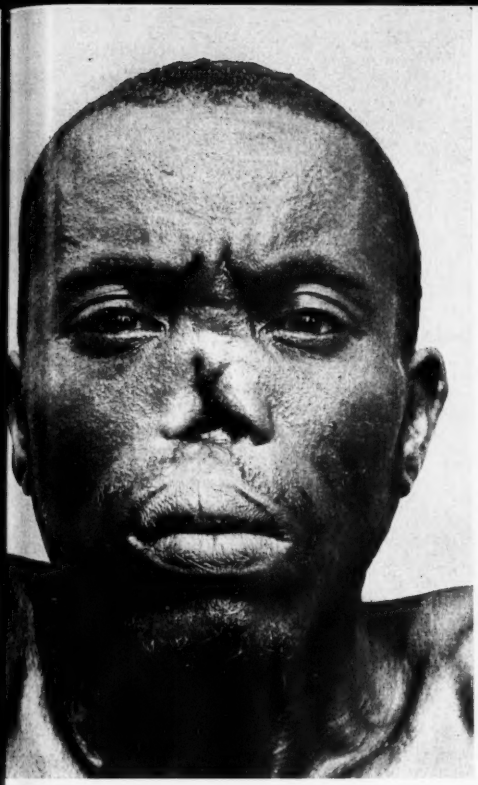
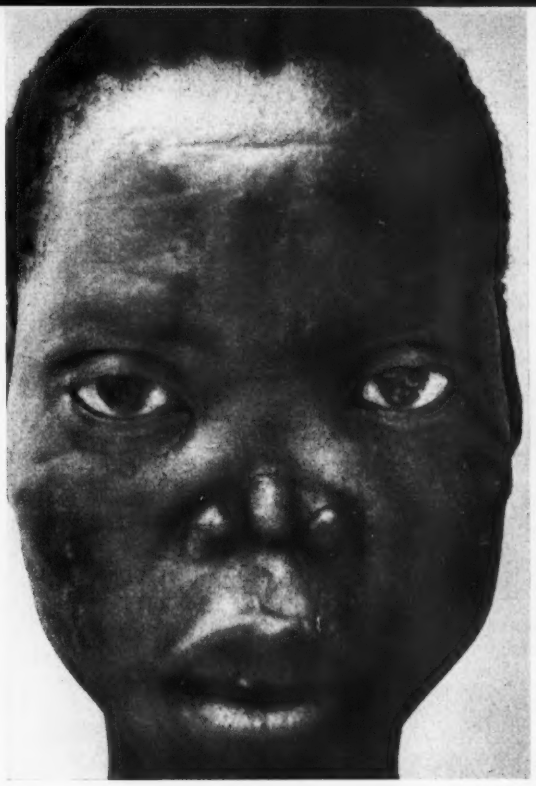
logical investigation shows *Onchocerca volvulus* and not *Myco. leprae*.

The neural form of leprosy is responsible for the characteristic deformities **(20)** of the disease. All the peripheral nerves may be affected, but the ulnar, lateral popliteal, median, and facial are most commonly so. The nerve trunks are usually painful to the touch, and often they are thickened, palpable, even visible **(21)**. This may help to distinguish the facial paralysis **(22)** or lagophthalmos **(23)** of leprosy from other forms of facial paralysis. The claw hand of leprosy **(24)** may resemble that of Dupuytren's contracture, which is not rare in countries where the prevalence of leprosy is high but the latter may be diagnosed by the almost invariable absence of anaesthesia; nor will there be any thickening of the ulnar nerve. Other peripheral nerve lesions may simulate leprosy, but the neuritis of leprosy is usually characterized by disturbances of sensibility, special preference for certain nerves, thickening of the nerve trunks, greater frequency of trophic ulcers, and absorption of the bones. Syringomyelia is the most difficult disease to distinguish from the neural form of leprosy. Not only is it uncommon, however, but there is no thickening of the nerve trunks as in leprosy; the topography of the anaesthesia is dependent upon the site of the







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lesion, which is central in syringomyelia, peripheral in leprosy; and dissociated sensory loss occurs in syringomyelia, with loss of sensibility to pain and heat but no loss of sensibility to touch, whereas in leprosy it is always possible to detect some alteration in sensibility to touch, and in the advanced stages sensibility to touch is completely lost.

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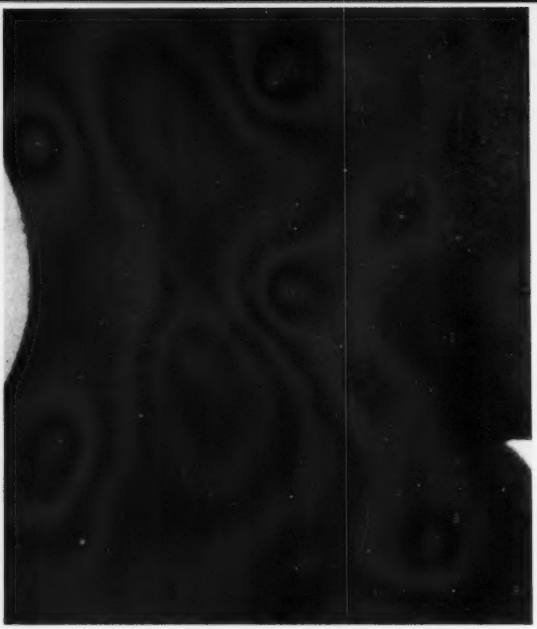

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and the plan of operations aims at treating all of them by 1961. At the end of 1958 the number of patients under regular treatment was 30 000.

Burma

In 1951, the Burmese Government requested WHO for technical assistance in leprosy control. In 1952, WHO provided a leprologist, fellowships, equipment and supplies to start a leprosy campaign. Finally, in 1956, a plan of operations was established by the Government, WHO and UNICEF.

Three pilot areas have been established, as demonstration projects and to serve for the teaching and training of the personnel for the campaign. The treatment of patients registered in other parts of the country is carried on at the same time. The progress of the campaign is shown in the following table:

Year	*Registered patients*	*Patients under treatment*
1951	3 537	3 537
1952	4 651	4 651
1953	7 108	7 108
1954	20 824	20 824
1955	31 952	29 592
1956	35 213	35 213
1957	40 382	37 291
1958	60 000	39 372

Thailand

WHO assistance to the leprosy campaign in Thailand began with the services of a short-term consultant, who estimated the total number of leprosy patients in the country to be about 200 000. The actual project, with WHO and UNICEF assistance, was started in 1955. WHO has provided two leprologists, one leprosy inspector and several fellowships, and a short-term consultant has visited the country to organize the rehabilitation of patients isolated in leprosaria. UNICEF has supplied drugs, vehicles and laboratory equipment.

The campaign began in the Khon Kaen pilot area in 1955. In that year the number of registered patients in the pilot area was only 193; in the three subsequent years the project developed and brought 6168 patients under treatment. The patients are treated at out-patient clinics and by mobile teams, but some cases are isolated in the village of Bannoi. In two years the campaign reached the consolidation phase, and the integration of treatment with that provided by the general health centres has started.

In 1958 the leprosy campaign was extended to include the provinces of Kahasarakam, Roi-et and Kalasin. In 1959 it was expected to extend the campaign still further, and include five more provinces.

A school for the teaching and training of leprosy workers was to be established in 1959 in Phrapradaeng.

The progress of the antileprosy campaign in Thailand can be seen from the following table:

Year	*Registered patients*	*Patients under treatment*	*Discharged patients*
1956	193	193	—
1957	4 327	4 327	—
1958	6 168	6 168	—
1959 (Jan.)	16 061	15 893	168
1959 (July)	21 384	20 506	878

Indonesia

International assistance to the leprosy campaign in Indonesia began in 1955 with WHO assistance. A consultant visited the country in that year to draw up a plan, and since June 1956 a WHO senior leprologist has been assigned to the campaign, UNICEF providing a certain amount of supplies and equipment.

In 1958 a plan of operations was signed by the Indonesian Government, WHO and UNICEF, in which the expansion of the two initial pilot areas, Blora and Bekasi, to five was envisaged, and the use of staff from the yaws campaign for leprosy case-finding was proposed. The leprosy project progresses slowly but satisfactorily.

Philippines

The leprosy campaign in the Philippines has been based on the compulsory segregation of patients. One of the leprosaria, Culion Sanitarium, is a model institution, in which much research work on the disease has been done.

International assistance by WHO and UNICEF began in 1954, and the plan of operations was signed in 1956. This plan is based on case-finding by mobile skin clinics and the integration of the treatment of the patients discovered with that provided by the rural health units. The project started with two mobile skin clinics, and now, in the second expansion phase of the programme, an increase to 10 mobile skin clinics is envisaged to cover a population of more than 8 million persons by the end of 1961.

The number of registered cases increased from 10 234 in 1956 to 13 201 in 1958. The estimated number of cases in the country is about 20 000.

Paraguay

The national leprosy programme in Paraguay began in 1948 with voluntary ambulatory treatment in out-patient clinics. In seven years, 953 new cases have been discovered and put under treatment.

In October 1955, with international assistance by WHO and UNICEF, treatment based on case-finding began in selected groups of the population (59.4% of the population have been examined). After only 30 months of the new policy, 923 new cases have been registered and put under treatment. All the 1876 patients discovered are under regular treatment, which is integrated with that provided by the general health services of the country.

The plan of operations also envisaged the regular surveillance of the contacts of leprosy patients and the protection of lepromin negative contacts of lepromatous patients by BCG vaccination.

* *
*

Leprosy control, with international assistance, is also developing in the following countries and territories: Ceylon, Colombia, Ethiopia, French Cameroons, Gambia, Iran, Madagascar, Sierra Leone, Solomon Islands, and Turkey.

Some idea of what still remains to be done can be gained from a comparison of the numbers of cases now under treatment in countries and territories of Africa, South-East Asia and the Western Pacific (see Tables 3 and 4) and the prevalence estimates given in the section " Extent of the problem " (see page 8).

TABLE 3. AFRICA: LEPROSY PATIENTS UNDER TREATMENT

Country or territory	Population	Patients under treatment
Basutoland	638 900	306
Belgian Congo	13 000 000	249 546
Cape Verde Islands	20 000	13
Comoro Islands	200 000	424
French Equatorial Africa *	4 875 700	120 000(?)
French West Africa *	17 504 000	162 142
Gambia	266 500	3 000
Ghana	4 118 450	26 017
Madagascar	5 065 400	25 172
Mauritius	613 900	43
Mozambique	5 647 000	59 658
Nigeria		
Eastern Region	7 218 000	31 290
Northern Region	18 000 000	166 433
Northern Rhodesia	2 300 000	6 763
Nyasaland	2 500 000	7 761
Sierra Leone	2 000 000	4 260
Somaliland Pr.	650 000	3
Southern Rhodesia	2 811 500	1 294
Spanish Guinea	180 000	4 154
Tanganyika	8 788 500	4 700
Togo	1 200 000	19 000(?)
Uganda	5 700 000	30 000
Union of S. Africa	14 418 000	1 511

* This area still existed as a political entity when the leprosy campaign was started.

TABLE 4.
SOUTH-EAST ASIA AND THE WESTERN PACIFIC: LEPROSY PATIENTS UNDER TREATMENT

Country or territory	Population	Patients under treatment
Australia		
New South Wales	3 660 500	6
Northern Territory	32 500	400
Queensland	1 396 700	41
South Australia	886 200	4
Tasmania	328 000	—
Western Australia	700 000	250
Burma	20 000 000	39 372
Ceylon	9 179 200	3 140
China (Taiwan)	9 864 000	1 907
Fiji	345 700	557
Hong Kong	2 583 000	2 590
Indonesia	84 186 000	26 756
Japan	91 085 000	10 841
Nauru	4 300	47
Netherlands New Guinea	342 600	781
Papua—New Guinea	1 779 100	2 272
Philippines	23 122 200	13 201
Polynesia	69 500	280
Ryukyu Islands	837 000	1 270
Singapore	1 474 000	3 950
Thailand	22 811 700	20 506

THE ECONOMIC ASPECT OF LEPROSY

Leprosy is a heavy economic burden to its victims, their families and society, not just for a brief period of time, but usually for many years and even until the death of the victim. While modern therapy may shorten the period of active disease, recovery does not always bring about an improvement in the physical, emotional and social effects of the disease. The prevalence of leprosy is greatest in the less developed, poorer parts of the world. Leprosy, therefore, constitutes a major international health problem, one which falls most heavily on the communities that are least able to bear the economic burden which it imposes or to devote their resources to ways and means of overcoming it.

Leprosy affects the working capacity of a patient in many ways. The fear and prejudice it arouses cause society to cast out, not only patients incapacitated by leprosy and unable to work, but also those who, though affected, are still capable of doing some work. Leprosy is a chronic disease, but acute reactions, e.g., neuritis and fever, can appear in the course of the disease, and during such reactions the patient is unable to work and should be hospitalized. Finally, the disease is characterized by the frequency of disabilities and deformities, which diminish the patient's working capacity to a varying degree.

In spite of the world-wide awareness of the problem, it is surprisingly difficult to obtain accurate information about the frequency and type of deformities current in the various endemic areas. The frequency of deformities and disabilities varies greatly from one country to another; in some countries regions exist in which disabilities are more frequent and serious and appear in young people. On the ground that it would be very useful to obtain accurate information about the frequency of deformities and disabilities in various countries and in various types of the disease, the leprosy unit at WHO Headquarters sent to the governments interested in the problem the following scheme of classification of deformities, with a request for the relevant information:

Scheme of classification for physical disability resulting from leprosy

A. *Hands*

Grade 1 — Anaesthesia to pain.
„ 2 — Mobile claw hand. Useful thumb.
„ 3 — Intrinsic paralysis involving fingers and thumb, or fingers only but with contracture.
„ 4 — Partial absorption of the fingers but with useful length remaining.
„ 5 — Gross absorption. Stumps only left.

B. *Feet*

Grade 1 — Anaesthesia.
„ 2 — Trophic ulceration (present or past).
„ 3 — Paralysis (dropped foot or claw toes).
„ 4 — Partial absorption of the foot (up to one-third of surface area of the sole lost).
„ 5 — Gross absorption (more than one-third of the foot lost).

C. *Face*

Type 1 — A permanent mark or stigma of leprosy not amounting to disfigurement (loss of eyebrows, deformity of the ear).
„ 2 — Collapse of nose.
„ 3 — Paralysis of the eyelids, including lagophthalmos.
„ 4 — Loss of vision in one eye or dimness of vision in both eyes (can count fingers).
„ 5 — Blindness.

D. *Miscellaneous*

Type 1 — Gynaecomastia.
„ 2 — Involvement of the larynx.

Note : For record purposes it is suggested that it be stated whether conditions under A, B and D.1 are unilateral or bilateral.

Information so far received about the frequency of deformities and disabilities makes it possible to affirm that over 15% of the total number of leprosy patients are affected, the frequency naturally being much higher among patients in institutions than among patients receiving ambulatory treatment, as generally patients with serious deformities and disabilities come voluntarily to the institutions.

Disabilities and deformities are more frequent among males; in certain regions the differences in frequency between the sexes is more significant than in other regions.

The information received up to now is as follows:

Country	*Total number of patients investigated*	*Total percentage with disabilities*
Brazil (Dr Diniz)	26 264	56.5 (patients from institutions only)
Uganda (Dr Kinnear Brown)	3 130	34.4
India (Dr Hemerijckx — Belgian Leprosy Centre, Polambakkam, Madras State)	2 479	18.3
Venezuela (Dr Convit)	8 286	16.4
Martinique (Dr Montestruc)	685	16.0
Spain (Drs Gay Prieto and Contreras)	1 867	15.4

If it is taken for granted that patients with extreme anaesthesia are more liable to develop trophic ulcers and subsequent mutilations, it can be accepted that at least 25% of the total number of leprosy patients need physical rehabilitation. In other words, there may be about 2.5 million leprosy patients throughout the world in need of special care so as to prevent or correct deformities and disabilities.

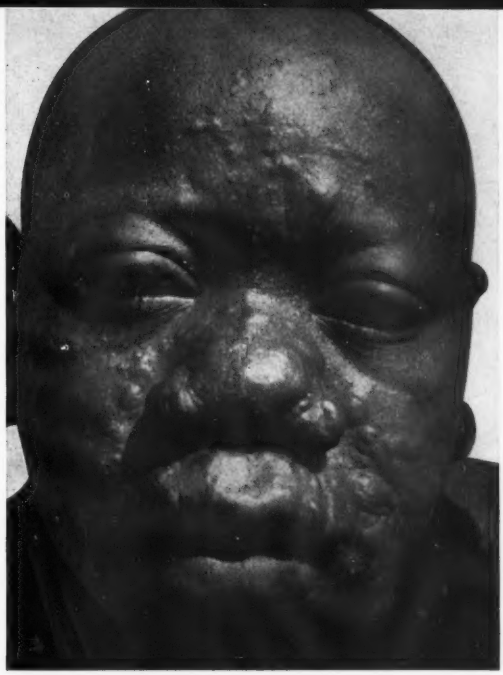
The most frequent deformity is claw hand, e.g.:

	Percentage of patients with claw hand
Brazil	33.3
Uganda	16.4
India (Madras)	10.8
Venezuela	4.9
Spain	6.1

Treatment with sulfones in the early stages of the disease can prevent the appearance of deformities in a great number of cases. Statistics received from Venezuela demonstrate this clearly: among 1361 leprosy patients suffering from disabilities, deformities appeared in 1168 cases before treatment, and in only 193 cases after treatment had started. However, in the case of damage to the nerves, it is evident that sulfone treatment cannot stop the progressive development of deformity.

The cost of leprosy control is impossible to estimate: it varies from one country to another and is related to the salaries of the medical and paramedical personnel engaged on the work. Ambulatory treatment is the cheapest treatment; the isolation of leprosy patients in institutions increases the cost of a leprosy campaign considerably.

reatment of leprosy



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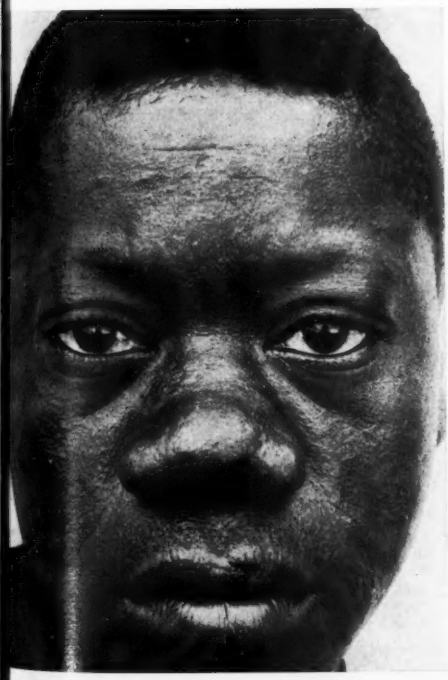
henceforth be dead to the world, and live in God." ecclesiastical injunction (see page 4) reflects an de to leprosy which has lingered on until comparatively nt times. The application of modern hygienic principles especially, the advent of successful chemotherapy changed the picture completely, however, and lutionized the outlook for the leper, enabling him to be ed in the same way as any other sick person and to me his normal place in society when cured.

kinds of treatment have been tried in leprosy, from ew-nut oil and madder to arsenic and mercury. Chaulgra oil, a native remedy on the west coast of India, irst used in medicine in 1854. It became the mainstay eatment, alone or in combination with other drugs such sorcinol and camphorated oil. Unfortunately the relapse was high, and its effectiveness was limited chiefly to lepromatous and non-lepromatous cases.

e search for more effective drugs received fresh tus with the discovery that certain derivatives of enylsulphone exert a bacteriostatic action on the tive organism of leprosy. 4 : 4′-diaminodiphenylsulfone (DDS) was synthesized by Fromm and Wittmann as long as 1908, during research in dye chemistry. However, nobody took any interest in this compound until 1937, when e et al. reported that it was effective against streptococcal infections in mice.

1937, Tillitson obtained the first soluble sulfone derivative, the sodium di-dextrose sulfonate of diaminodiphenyl sulfone. This was given the name " Promin " and was the first sulfone compound used in human therapy. Three years later, Feldman, Hinshaw and Moses published a preliminary report on the effect of Promin in experimental tuberculosis in guinea pigs, and Rist, Block and Hamon reported the inhibitory effect of sulfone drugs on avian tuberculosis. Cowdry was the first to use sulfones in the treatment of rat leprosy, but the results were not so good as in tuberculosis.



Promin was used for the first time in human leprosy at Carville (USA) in 1941 by Faget et al., their first report on this trial being published in November 1943. In spite of the encouraging results, only a few papers on the subject appeared in the following two years.

During the Fifth International Congress on Leprology, held in Havana in 1948, more than 30 papers were presented about the effects of sulfone drugs on leprosy, and the opinion was expressed in the report of the Committee on Therapy that : " . . . the sulfones are the present drugs of election for the treatment of leprosy ".

1. Before treatment with DDS
2. After treatment with DDS

1

2

3

At that time, only DDS derivatives were in use, namely, p-Diazone (disodium formaldehyde sulfoxylate of diaminodip sulfone) and Sulphetrone (tetrasodium $\alpha:\gamma:\alpha':\gamma'$ - tetrasulfo 4:4′-bis-γ-phenylpropylaminodiphenylsulfone). These drugs rather expensive and had to be administered daily, some o (e.g., Promin) by intravenous injection. Thus the use of s drugs was almost restricted to institutions, and they wer considered suitable for mass treatment on a large scale.

It was then the general belief that the parent sulfone (DDS) w toxic a drug for clinical use, but after 1948 some workers (Chaussinand, Lowe) began using it in a much reduced d reaching the maximal weekly dose very slowly, and they found used in this way, DDS was as safe and effective as its deriv

Finally, the demonstration by Lowe and Davey that a sui blood level of DDS can be maintained by administration o bi-weekly doses, and the work of Laviron, who obtained ex results by using bi-monthly injections of DDS suspension in chaulmoograte, made possible the widespread use of sulfone A new epoch in the fight against leprosy had begun.

DDS is an excellent antileprosy drug and highly suitable for campaigns in under-developed countries because, besides cheap and very effective, it has a low toxicity and is well tole when properly administered. Moreover, it is very suitable for an tory treatment, as it may be administered in weekly or bi-mo doses, and it does not give rise to drug resistance.

This does not mean that DDS is the ideal drug against lep it has certain disadvantages as well: the treatment time is too it is not effective in 100 % of cases; and it provokes intolerance reaction) in a few cases. More active, better tolerated, and less drugs are still a desideratum. Leprosy workers all over the w are trying to find them.

At present, trials with new drugs such as derivatives of thi (DPT) and of ethylmercaptan (Etisul) are being carried out, particu by Davey in Nigeria, with promising results. However, experi on an even wider scale are necessary to assess the true val these new compounds in leprosy therapy.

1, 2 & 3. Three stages of treatment with DDS

The expenditure of international agencies on leprosy control since 1953 is shown in the following table:

Year	*WHO (regular budget)* $	*WHO (Technical Assistance)* $	*UNICEF* $
1953	9 900	—	93 000
1954	8 200	—	8 000
1955	7 800	5 400	317 300
1956	23 200	1 300	885 500
1957	63 700	9 800	161 000
1958	126 300	24 900	429 000

The cheapest leprosy campaigns are those in Africa, where low cost is related to the high prevalence and patterns of the disease, and the development of ambulatory treatment. The estimated cost of treatment in projects in Africa assisted by WHO and UNICEF varies from $2 to $8 per patient per year.

REHABILITATION

It is necessary to re-emphasize that the most important measure in the prevention of deformities is the detection and treatment of early cases of leprosy. The earlier the treatment is begun, the more chances there are of completely preventing the appearance of deformities.

When the first symptoms of disability appear it is possible to prevent the development of incurable deformities. A most important measure is the education of patients with anaesthetic hands and feet. They should be taught about the hazards to which the loss of the perception of pain now exposes them. It is necessary to impress upon the personnel of the leprosy campaign the importance of spreading this knowledge and convincing the patients that most leprosy deformities are preventable or correctable. The patients should learn to:

(1) use special handles and holders for hot articles;

(2) inspect their own hands and feet daily for thorns and blisters;

(3) dress and splint every wound and keep it splinted until it heals;

(4) wear well-fitting shoes or sandals and avoid shoes made with nails.

In addition, the patient may need advice about types of employment that will not harm his hands or overtax his feet.

The treatment of reducible claw hands can be carried out as ambulatory treatment by auxiliary personnel instructed in this task. This kind of treatment should be provided in all institutions, and the personnel in charge of the leprosy campaign should learn about the possibilities for physical rehabilitation of patients by very simple measures.

Many deformities, such as irreducible claw hand and certain cases of foot drop, can be treated by physiotherapy. The physiotherapy equipment needed for the treatment of patients is not very expensive, and all institutions should possess it.

Trophic ulcers, the second most frequent complication found in leprosy, can be treated in institutions by rest and antibiotics. To ensure complete rest for the foot in cases of trophic ulcer of the feet, plaster of Paris is the recommended method. When the ulcer is cured, the patient's foot should be protected by a walking-iron or rocker to prevent relapse.

Many deformities which are not preventable or correctable by physiotherapy can be cured by plastic or orthopaedic surgery. It is necessary to encourage orthopaedic, plastic and ophthalmic surgeons from general hospitals to work part-time in properly equipped leprosy sanatoria in those countries in which leprosy is a problem.

Reports of Expert Groups

Serological epidemiology *

Ten years after the great pandemic of 1918-19 the swine influenza virus was discovered and on epidemiological grounds it was suggested that this virus might be related to the cause of the pandemic. Twenty-five years later, serological studies lent support to this hypothesis but it remains unproven. If serum samples had been taken before and after the pandemic and suitably preserved, a definitive answer to the question would have been possible and we would undoubtedly know much more than we do about one of the great disasters in the history of the human race.

In 1949, a collection of sera was obtained with some difficulty from a group of Alaskan Eskimos. The object at that time was to measure type 2 poliovirus antibodies. No practical method was then available for testing other types of poliovirus antibodies. These sera were, however, carefully stored and when, subsequently, methods of testing for other antibodies became available, the sera were examined and the important observation was made that neutralizing antibodies to poliovirus persist for twenty years or more in the absence of reinfection.

These are but two of a multitude of examples of the potential value of carefully preserved collections of sera. By their study, much light can be thrown on the past history and future evolution of many communicable diseases, both those of known causation and those of which the cause has yet to be discovered.

This approach, which has been called serological epidemiology, is not, however, limited to the study of communicable diseases. The report of the WHO Study Group on Immunological and Haematological Surveys [1] also foresees considerable advances in the study of human health and disease through the examination of blood samples for cholesterol and serum proteins, as well as for factors present in anaemias and those of genetic importance, e.g., abnormal haemoglobins and blood groups.

The proposed multi-purpose approach raises a number of problems which are considered in detail in the report. First amongst these is the development of sampling methods to ensure that the collection is, in fact, representative of the population. The interpretation of the data obtained will often depend on this. The report contains detailed descriptions of different methods which may be adopted. The problems involved in processing the blood specimens collected and in storing the sera for long periods while preserving antibodies and other substances are also considered. Lyophilization is recommended as perhaps the best aid to prolonged storage, even though it may damage certain antibodies. The Study Group recommended studies of the effect of different storage methods on different antibodies.

The importance of establishing international collections of sera under the administrative control of WHO was stressed, and it was recommended that selected laboratories should be designated to undertake this work. Collections of sera already exist in a number of laboratories; information regarding them should be assembled and steps taken to co-ordinate research involving their use, so

* WHO Study Group on Immunological and Haematological Surveys (1959) *Report (Wld Hlth Org. techn. Rep. Ser.*, No. 181), 35 pages. Price: 1/9, $0.30, Sw.fr. 1.—. Published also in French and Spanish.

[1] Members of the Study Group: Dr J. B. Brooksby, United Kingdom; Dr J. Casals, USA; Dr. D. Horstmann, USA (Rapporteur); Professor K. Raska, Czechoslovakia (Vice-Chairman); Dr F. Yates, United Kingdom (Chairman). Representative of the Food and Agriculture Organization: Dr E. Eichhorn. Secretariat: Dr G Arroyave, Guatemala (Consultant); Dr J. H. P. Jouxis, Netherlands (Consultant); Dr A. A. Payne, WHO (Joint Secretary); Dr B. Pirc, WHO (Joint Secretary).

that the fullest advantage may be taken of them. A series of pilot studies is recommended to determine the feasibility of the technical procedures outlined and to improve on them where necessary.

Recognition that animals, both domestic and wild, play a role, often of major importance, in many human infectious diseases led the Group to propose that similar collections of animal sera be established with the co-operation of FAO, which was represented at the meeting.

The full potentialities of this approach cannot yet be defined. Further technical development may result in its application to a wide range of human disease problems.

Automation and its human repercussions *

While some look upon automation as the gateway to " the golden age ", others view it with apprehension. Certainly, whatever its advantages or disadvantages, it will have important physiological, psychological and social consequences for human beings.

The mental health problems of automation were examined recently by a WHO Study Group,[1] and it is clear that while automation may in some ways help to improve mental health, it will also provoke new types of strain which require immediate study. It is, moreover, probably not automation in the form of automatic co-ordination of machine tools on production lines, or in the form of automatic control over manufacturing processes, that is liable to bring about the most revolutionary changes in mechanized work, but a third type of automation, i.e., the rapid and automatic processing of an increasing range of technical and business information by the electronic digital computer. This type of automation goes much further in replacing certain human activities hitherto considered to be irreplaceable, since it imitates the functioning of the human brain and can be applied to operations such as the recording, co-ordination and analysis of administrative information. The consequences of automation will thus very probably appear more clearly and rapidly in certain types of office than in industrial plants.

At the present time, the general public is badly informed about automation, and tends to regard it as a symbol of rapid innovations in commercial and industrial work, involving the introduction of new and complicated machines, which a certain type of literature has unfortunately painted as monstrous and all-powerful. Emotional reactions to its introduction range from unreasonable hopes of a rapid rise in living standards to fears of upheavals in conditions of employment and of difficulty in adapting to the new machines. These reactions, however, are of an anticipatory nature and are not based on actual experience. In the meantime, workers in automated undertakings are already suffering from physiological and psychological strain. In the first place, it should be noted that, because of its very nature, automated work may have psychological consequences: for example, if the manual activity of a worker who was been accustomed to assess his work on the basis of his physical effort is reduced, he will feel himself less useful and suffer from a sense of inadequacy; if contact with the machine or with the object on which he is working is eliminated or reduced, he will see his task in a more abstract form and this may lead to anxiety; if his responsibility is increased, his job may become more of a strain. What kind of strains are imposed

* WHO Study Group on the Mental Health Problems of Automation (1959) *Report* (*Wld Hlth Org. techn. Rep. Ser.* No. 183), 30 pp. Price: 1/9, $0.30, Sw. fr. 1.—. Published also in French and Spanish.

[1] Members of the Study Group: Dr C. M. Arensberg, USA (Vice-Chairman); Dr H. C. Ganguli, India; Mr A. Lucas, France (Rapporteur); Dr V. N. Myasischev, USSR; Dr A. C. Pacheco e Silva, Brazil; Dr J. Parisot, France; Dr A. T. M. Wilson, United Kingdom (Chairman). Representatives of the International Labour Office: Mr H. G. de Bivort; Dr S. Fuchs. Representative of the United Nations Educational, Scientific and Cultural Organization: Dr E. Jacobsen. Secretariat: Dr E. E. Krapf, WHO (Secretary); Dr R. M. Malan, WHO Regional Office for Europe; Dr Maria Pfister, WHO.

upon the worker? First, there is the nervous strain caused by the need for unremitting attention to signals of varying perceptibility, often separated by very long intervals. The less the physical activity of such a worker and the greater the number of indicators to be watched, the more the nervous tension to which he will be exposed. It is clear that in these circumstances particular importance will attach to working conditions, such as temperature, sound-proofing, lighting, and the position of the operator and of the machines. By preventing the operator from communicating with others, automated work tends to isolate him both physically and mentally. This feeling of isolation may be heightened by the background noise made by the machines.

Tensions of this kind will, of course, affect individuals very differently according to their cultural level or personal capacity for adaptation.

In addition to its direct effects upon the workers' mental health, automation will undoubtedly have indirect social consequences. Families may, for example, be affected by the increased mobility of labour. There will be problems connected with the movement of workers, not only from country to country, but also between urban and rural areas in one and the same country. Because of the new working conditions, it is probable that workers will feel a need to live in a different type of social environment, as far as housing and leisure are concerned. The most serious difficulties indirectly affecting mental health are, however, liable to arise in connexion with the organization of the work itself. If automation calls for more shift work (as appears very likely), this will certainly be opposed by the workers and their families; this point must be given special consideration at the outset.

On the other hand, automation may provide certain satisfactions: for example, in an entirely automated plant, each operator becomes more or less his own master; the gap lessens between the factory worker and the office worker, who was formerly considered as enjoying more security; changes of occupation in middle age should be easier.

Generally speaking, efforts to mitigate the harmful effects of automation on mental health should be based on information and education. Too much importance cannot be attached to active co-operation on the part of the press, radio and television and, above all, to the provision of objective information, avoiding sensational eye-catching headlines which may cause needless anxiety. Education in this field will be all the more effective if it is directed primarily towards those in key positions, i.e., managers, engineers, trade-union leaders and the medical profession, particularly works doctors—although, of course, the worker himself must also be informed. Such information should be a continuing process. In some cases it might take the form of a consultation, which would not only help to dissipate the worker's fears, but would also reassure him that his views were being taken into account. Many other methods of preventing the psychological ill-effects of automation can be cited, such as careful selection of personnel; provision of rest and recreation rooms; organization of visits to particularly isolated workers in the factory; enabling families to share the professional interests, satisfactions and worries of the operators, e.g., by arranging visits to the factory; organization of lectures and seminars by trade unions.

The repercussions which automation may have on human beings are so far-reaching that there is every justification for a thorough study of the question. A considerable volume of preliminary information will have to be assembled, however, and the Study Group therefore recommended that priority be given to a series of orientation and pilot studies, making wide use of the facilities offered by medico-social services. A second type of study might utilize the usual epidemiological methods. This research work would cover the psychological and psychiatric effects of the new factors in the working environment and the demands which automation makes upon workers. Subsequent research might investigate, among other subjects, adaptation to shift-work (where this is being introduced or extended) and the effects of alterations in distribution of attention or of " sublim-

inal" attention on, for example, extra-occupational activities and sleep. One specialized but very important question also calls for elucidation, namely; will the employment prospects of certain categories of handicapped workers be improved by the considerably reduced physical effort required in automated plants?

Health Legislation

Communicable diseases in schools: a comparative study

Absences from school are primarily due to the communicable diseases common among children of school age. The proximity of large numbers of children in the schools and the fact that they are receptive to these diseases favour their spread. The health authorities are thus faced with two problems: to establish measures to prevent the spread of communicable diseases in schools and, on the other hand, to avoid rigid regulations which would interfere with the normal course of school life.

It would seem that a satisfactory solution to these problems has yet to be found, though measures of some sort are applied in most countries and often embodied in the legislation. They specify in particular that children with communicable diseases must not attend school; contacts of a sick child may also have to stay away, the incubation period of the disease being taken into account.

The regulations embodying these measures show two tendencies: the first being to specify fixed periods of exclusion from school, e.g., that a child suffering from poliomyelitis may not return to school until 28 days after the onset of the disease. The second is to allow the medical practitioner or health authority to exercise discretion in each particular case. When the regulations of the various countries that lay down rigid periods of exclusion from school are compared, the periods specified for the same disease are often found to be substantially different. It is therefore obvious that the establishment of rigid standards is not the ideal solution. Nevertheless a comparison of the recent study published in the *International Digest of Health Legislation* [1] with the study on the same subject published in 1952 shows that a more flexible tendency is now evident. Rigid periods of exclusion are gradually being replaced by measures which allow both sick children and contacts to return to school sooner. The strict exclusion from school of contacts is being replaced by regular surveillance by the school nurse or school medical officer, including, *inter alia*, bacteriological examinations; this more liberal attitude doubtless presupposes a good school medical organization. A more radical approach is that of Burnet, who stated in 1954 that, between the ages of six and twelve, children should normally have been infected with each of the common epidemic diseases of childhood and have emerged from them unharmed. Unless this happens in childhood, the individual will reach adult life without immunity and will then be liable to have these diseases in a much more acute form. German measles (rubella) is a case in point. Only a few years ago it was deemed necessary to specify periods of exclusion from school both for patients and for contacts, whereas now the situation is entirely different. As early as 1952 a cantonal regulation in Aargau (Switzerland) stated that the exclusion from school of children suffering from German measles was inadvisable, since it was preferable that children should contract this disease in infancy. For certain other diseases, moreover, such

[1] See *Int. Dig. Hlth Leg.*, 1959, **10**, 193. This study is also available in pamphlet form (price: 3/6, $0.70, or Sw. fr. 2.—).

as mumps or measles, the exclusion of contacts is pointless, because the disease may be spread during the incubation period. It may be concluded that regulations governing communicable diseases in schools should be frequently changed and adapted in accordance with new knowledge.

The study published in the Digest covers the legislation of some fifteen countries. The provisions of the regulations have been compared with recommendations in the literature and in authoritative handbooks, for example, the *Handbook for Medical Officers of Schools on School Health and Communicable Diseases*.[2] If the recommendations of the latest edition of this work are compared with those of earlier editions, it will be seen that the measures now proposed are much less stringent.

Most of the regulations indicate measures to be taken on the occurrence of a number of diseases, those most frequently mentioned being whooping cough, diphtheria, bacillary dysentery, cerebro-spinal fever, mumps, poliomyelitis, measles, German measles, scarlet fever, typhoid fever, chickenpox and smallpox.

The study in the Digest is mainly concerned with comparing the measures relating to these diseases, and the Appendix contains tables showing the statutory requirements for each of them. To illustrate the differences in the regulations it is enough to cite the measures laid down for whooping cough: for this disease, the period of exclusion from school ranges from 21 to 42 days from the *onset of the typical paroxysms*, from 15 to 21 days after *the subsidence of paroxysms*, or from 21 to 30 days from the *first appearance of symptoms*. In certain countries it is specified that children may return to school on subsidence of the paroxysms, provided that there has been a certain period of exclusion. In two countries, this must not be less than 28 days, and in another not less than 21 days and not more than 42 days. The regulations of one country specify that the period of exclusion, fixed at 28 days from the onset of the disease, may be shortened in mild cases if a bacteriological examination shows the patient to be free from infection.

Although certain experts are opposed to the exclusion of contacts, most regulations require a period of exclusion ranging from 7 to 21 days, even 30 days in one case. However, as a general rule, exclusion is only imposed if the child is under a certain age or has not been immunized by a previous attack of the disease or, as in Tunisia, by immunization. In some countries the regulations state that contacts who have already had the disease are not to be excluded, whereas non-immunized contacts are to be excluded for 14 days. Another text prescribes a period of exclusion of 21 days, dating from the isolation of the patient, for children from 3 to 6 years of age who have not previously had the disease, but allows other children to attend school. In three countries the regulations do not require any exclusion, and one recommends it only if contacts have a cough.

In most regulations the term "contact" embraces the brothers and sisters of the patient, but often it covers other children who have been in contact with the patient during the incubation period or the course of the disease. Sometimes, as for example in Aargau (Switzerland) no definition of contact is given, and it is left to the medical practitioner in attendance to decide which persons are to be subjected to quarantine, at the same time seeing that the fewest possible limitations are imposed on the movement of the persons concerned. In New Jersey (United States) the designation of contacts is at the discretion of the health officer.

For re-admission to school of a child who has been sick or of a contact, the usual requirement is a medical certificate to the effect that there is no longer any risk of infection. Sometimes, the decision is taken by the health department or the school medical officer. In the Union of South Africa, for example, the stringent nature of the exclusion measures is lightened by the fact that the medical officer of health may shorten the period of exclusion if he is of the opinion, as a result of the bacteriological

[2] Medical Officers of Schools Association (1954) *Handbook for medical officers of schools on school health and communicable diseases*, 12th ed., London

examination or the adoption of special measures, that there is no risk of the disease being spread. On the other hand, he may prolong the period of exclusion if he has good reason to believe on the basis of the results of the bacteriological examination or on any other evidence that the child is a carrier in a virulent form of diphtheria, scarlet fever, cerebro-spinal fever, poliomyelitis, or typhoid or paratyphoid fever. The principal of the school may re-admit a child who presents a medical certificate to the effect that he is cured, or, in certain rural areas, if he is satisfied that the child is free from infection.

In most countries the closure of schools is allowed only in special circumstances. The general tendency is to limit closure and to leave it to the initiative of the health department.

Notes and News

Regional Committee for Africa

The WHO Regional Committee for Africa held its ninth session at Nairobi, Kenya, from 21 to 26 September 1959. It was attended by representatives of 8 Member States and 3 Associate Member States of the African Region. The Malagasy Republic (Madagascar) was separately represented and there were also present observers from UNICEF and several non-governmental organizations. The Director-General of WHO was represented at the session by Dr P. Dorolle, Deputy Director-General.

The following officers were elected: Dr A. J. Walker (United Kingdom), Chairman; Dr Norman Williams (Federation of Nigeria), Vice-Chairman; Dr S. P. Tchoungi (France) and Dr J. St G. Warmann (Ghana), Rapporteurs.

In his report, which covered the period July 1958-June 1959, Dr F. J. C. Cambournac, WHO Regional Director for Africa, stated that the health situation in the Region gave cause for sober satisfaction in some respects, but for continued concern in others. The mass campaign against yaws, in which 17 million people had already been examined and more than 8 million treated, had brought the eradication of the disease within sight, notably in Liberia and Nigeria. The success of the campaign had led the population in certain regions of Nigeria spontaneously to raise voluntary contributions for the development and maintenance of rural health centres which would not only deal with what remained of the yaws problem, but would also watch over the general well-being of the people. The development of rural health centres in other countries of the Region was equally encouraging.

About a million leprosy cases in Africa were under treatment with sulfones, and it was expected that nearly all would be reached eventually. In fact, it was hoped that the present generation of Africans would be the last to suffer from the disease to any large extent.

Antituberculosis work had been greatly extended. Nearly every country in the Region had asked for the services of the two WHO tuberculosis survey teams. A centre for the analysis and co-ordination of tuberculosis work in Africa would shortly be opened in Nairobi. In addition, several mass chemoprophylaxis projects were already under way or being planned in various territories of the Region. Control campaigns by governments had greatly reduced the incidence of smallpox in some areas, and eradicated the disease in others. Several governments had requested WHO assistance for the organization of large-scale antismallpox campaigns.

In attempting to apply the WHO world-wide malaria eradication programme, the Regional Office had been faced with certain special problems, which had obliged it to reconsider and improve its antimalaria measures through survey and research. In some areas, including the southern Cameroons, Kenya, the southern part of the Federation of Rhodesia and Nyasaland, Mauritius, Swaziland, and the Union of South Africa, transmission had been interrupted by

residual spraying, and the surveillance stage had been reached. A co-ordinated inter-country eradication campaign, which had started in south-east Africa, promised well. In other parts of Africa, however, the search was still going on for the right combination of methods which would achieve eradication in the face of complications arising from local epidemiological conditions.

Much also remained to be done in the fields of maternal and child health, environmental sanitation, nutrition, the provision of nursing services, and mental health. The improvement of public health services in Africa was rendered at once more difficult and more urgent by the tremendous economic developments taking place in most parts of the continent.

The Committee endorsed the proposed programme and budget for 1961, which called for an expenditure of $1 573 000 under the regular budget of WHO, $734 000 from United Nations Technical Assistance funds, and an anticipated $3 261 000 in contributions from UNICEF.

On the subject of the proposed International Health and Medical Research Year, which is to be reconsidered by the Thirteenth World Health Assembly in 1960, the Committee was of the opinion that the number and importance of health projects in Africa and elsewhere required the use of all available resources if they were to be brought to a successful conclusion, and that the efforts and expenditure involved in the proposed activity were unlikely to be commensurate with the benefits derived from it. It therefore recommended that the holding of an International Health and Medical Research Year be postponed.

The Committee urged Member and Associate Member States to establish national sanitation boards for the planning of water supply programmes, and to adopt the WHO standards for drinking-water as criteria of quality. It was recommended that a regional meeting or conference on water supplies should be held as soon as possible.

The Committee also recommended that every possible attempt be made to promote more frequent exchanges of information on anti-malaria campaigns between countries with common problems in this field, and urged that governments should be given the maximum possible assistance, in the form of advice on technical and administrative matters, for the implementation of these campaigns.

This year's technical discussions were on " Medical aspects of urbanization in countries south of the Sahara ". Twelve papers on various aspects of the subject were discussed. There was general agreement that governments could not afford to turn a blind eye to the rapid urbanization taking place in the Region. In towns all over Africa the number of inhabitants was exceeding the provision of essential services; this resulted in water shortages, the overloading of sewerage systems, the overcrowding of schools, and a number of similar problems. It was recognized that the solution of these problems did not, however, fall entirely within the province of the public health administrator, since it depended to a large extent on the encouragement of balanced rural and urban development through the improvement of social and economic conditions in the rural areas. Among the measures suggested for improving health conditions in the overcrowded urban areas were the creation of " green zones ", and the opening of nurseries for babies and small children whose mothers were out at work all day. These children were often left in the care of " Ayahs " scarcely older than themselves and completely ignorant of clean habits. By accustoming the children to good standards of hygiene, such nurseries " would be doing an immense service to the African communities and their citizens of the future ".

It was decided to hold the Committee's 1960 session in Accra, Ghana, at a date to be decided later, and to hold the 1961 session at the Regional Headquarters in Brazzaville, Republic of the Congo.

Regional Committee for the Americas

The eleventh meeting of the Directing Council of the Pan American Health Organization—which was at the same time the eleventh session of the WHO Regional Committee for the Americas—was held in Washington, D. C., from 21 to 30 September 1959. The meeting was attended by representatives of all PAHO Member States, with the exception of Bolivia, Costa Rica and Paraguay, as well as by representatives of

France, the Netherlands and the United Kingdom, representing certain territories in the Region. The Government of Canada designated an observer. Also represented were the United Nations, UNICEF, FAO, the Organization of American States, and 17 non-governmental organizations in official relations with WHO. The meeting was attended by Mr M. P. Siegel, Assistant Director-General of WHO.

Dr Abraham Horwitz, Director of the Pan American Sanitary Bureau and WHO Regional Director for the Americas, presented his annual report for the year 1958. In the discussions that followed several delegates spoke of recent health advances in their countries, and the importance of placing greater emphasis on environmental sanitation was stressed. The Council examined this problem in detail, and recognized that the resolution on the subject adopted by the Twelfth World Assembly was particularly applicable to the Region of the Americas. It was therefore decided to recommend to Member Governments that they give priority in their national health programmes to the provision of water supplies. The Director of PASB was asked to co-operate with Member Governments in this field and to establish a special account for the purpose, securing the financial participation of public or private organizations, national or international.

The Council expressed its satisfaction at the fact that, in some countries of the Americas, smallpox had already disappeared, while other countries of the Region were conducting intensive campaigns against this disease. It was recommended that governments give special attention to the continuation of programmes to maintain high levels of immunity, that they undertake nation-wide smallpox vaccination programmes where these had not yet been initiated, and that they study ways and means of producing and storing vaccines and furnish PASB with the information necessary for keeping up-to-date records of supplies of vaccine available for use in any emergency.

After hearing reports by the Bureau and by the country representatives on the status of malaria eradication in the Americas, the Council considered that the programme of malaria eradication was already well advanced and that it was necessary to employ the most careful epidemiological techniques to ensure that malaria had been completely eradicated in a given territory. It requested that the Director study the possibility of establishing in the Bureau a register of areas from which malaria had been eradicated, and lay down conditions to be fulfilled in order that a given area might be included in the register.

The Council also recommended that Member Countries of PAHO encourage the creation of co-ordinating committees of nation-wide scope for the study of mycoses, as well as undertaking epidemiological surveys to ascertain the extent to which mycoses present a health problem in the Americas.

The Council studied a report on the status of *Aëdes aegypti* eradication in the Americas and noted that Guatemala and Honduras were now free from this mosquito. It called upon the countries and territories that were still infested to intensify their eradication activities, and recommended that those countries in which the vector had already been eradicated maintain strict vigilance in order to prevent reinfestation.

Problems arising from the advertising of medical products were discussed by the Council, which asked the Director to study the present status of control of advertising aimed at the general public, and recommended to Member Governments that they adopt measures to prohibit false or misleading advertising of such products.

The Council expressed its agreement with the concept of an International Health and Medical Research Year, and recommended that Member Governments submit their comments and specific suggestions to the Director-General of WHO. It also recommended that they should start preparing plans to ensure full and effective national and local participation should the proposed activity be approved by the World Health Assembly.

The Council approved the programme and budget of the Pan American Health Organization for 1960, authorizing appropriations to a total of $4 100 000. As WHO Regional Committee for the Americas, the Council resolved to transmit to the Director-General of WHO the proposed programme and budget for WHO activities in the Region for 1961, so that he may take it into consideration when preparing the WHO budget for that year. With regard to the pro-

visional draft of the proposed programme and budget of PAHO for 1961, several delegations pointed out the difficulties their countries were having in meeting their quota assessments, and they therefore requested that no further increase be made in the programme in that year.

The Council expressed concern at the serious financial situation of the Pan American Health Organization as a result of the arrears in quota payments and the fact that the Working Capital Fund (WCF) was far below the authorized 60% level. It was agreed that a portion of the budget be assigned to the WCF to bring it gradually up to, and then to maintain it at, that level. Further ways of remedying the situation were suggested, including the adoption by governments of administrative and legislative measures that would make it possible to adjust the dates of quota payments to the fiscal year of PAHO, and steps to increase the income of the Organization through the sale of publications and the provision of other services.

The Council invited Member Governments to take the United Nations Special Fund into account as a potential source of international assistance, particularly for the development of water-supply programmes. It was also recommended that Member Governments include a larger proportion of health activities in their annual requests to the Technical Assistance Board.

The representative of the United States announced to the Council that his Government had decided to contribute $200 000 to PAHO in 1960 for the water-supply programme, as well as a further $2 000 000 to the PAHO Special Malaria Fund. The Council expressed its appreciation for these important voluntary contributions.

Colombia and El Salvador were elected to the Executive Committee of PASB on the termination of the periods of office of Guatemala and Peru.

An entire working day was devoted to technical discussions on "Technical, financial and administrative aspects of water supply in the urban environment in the Americas". The topic selected for the technical discussions at the next session was "Technical, administrative, legal and financial aspects of garbage and refuse disposal".

The Council held a special meeting at which a scroll recording his designation as Director Emeritus of the Pan American Sanitary Bureau and a gold medal were presented to Dr Fred L. Soper, former Director of the Bureau.

The invitation of the Government of Cuba to hold the twelfth meeting of the Directing Council (twelfth session of the WHO Regional Committee) in Havana was accepted.

Indexing and abstracting periodicals

A recent supplement to the WHO *Library News* (1959, Vol. 12, Supp. 2) [1] contains the second edition of an annotated list of current indexing and abstracting periodicals in the medical and biological sciences. The first edition of this list, which was issued in 1953, was limited to current indexing and abstracting periodicals available in the WHO Library. In the new edition, this limitation has been removed and an attempt made to compile an annotated list that includes all the more important indexing and abstracting periodicals in medicine and the allied sciences published currently throughout the world.

The information given on 310 publications includes the name and address of the publisher, the 1959 subscription price, the frequency of publication, the number of periodicals regularly scrutinized, the number of abstracts or title entries published, etc. and is supplemented by an index to the principal subjects, to the countries whose literature is abstracted, and to the names of publishing or sponsoring institutions or societies.

In bringing the information contained in the first edition up to date and in extending the scope of the list, every effort has been made to provide information based on a first-hand examination of the original publication.

Symposium on Pesticides

In view of the ever-increasing importance of pesticides in vector control, and the rapid

[1] Copies may be obtained from the WHO Library, Palais des Nations, Geneva.

developments in this field, the WHO Regional Office for Africa held a Symposium on Pesticides at Brazzaville, Republic of the Congo, from 9 to 14 November 1959. As the subjects discussed were of vital concern to all public health staff working on the control of disease vectors, the widest possible representation of the countries and territories of the Region was sought.

The discussions, which were led by four world specialists in vector control, came under the following main headings: chemistry, specifications and application, including problems of sorption and storage in the field; determination and interpretation of resistance levels; toxicity of pesticides to man, including the toxicity of insecticides at present in use or likely to be introduced, and methods for the protection of those coming into contact with them; vector control and insecticide resistance.

Vaccination with live poliovirus

At the beginning of 1958 the Health Centre of Andes—a mountainous rural area in South Antioquia, Colombia—became alarmed at the number of cases of paralytic poliomyelitis occurring within its province. A request for assistance was sent to the Pan American Sanitary Bureau (PASB), which acts as the WHO Regional Office for the Americas. PASB, after an assessment of the situation, prepared a plan for oral vaccination with live attenuated poliovirus. Children between 2 months and 6 years of age were vaccinated, since serological tests had shown them to be particularly susceptible to infection and since all the cases of paralysis had occurred in this age-group. The programme was described in a recent issue of the *Boletín de la Oficina Sanitaria Panamericana*.[1]

In all, 7378 children were vaccinated, their antibody response being assessed before and after vaccination. Nearly 1000 of the children did not appear to have had any previous contact with poliomyelitis. Before the programme began there had been 15 proven cases of paralytic poliomyelitis in the area; after it began there were 4 more, but only in places where vaccination had not yet been carried out. No cases occurred among the children vaccinated or among their contacts, and there were no adverse reactions. There were a few cases of gastro-intestinal disorders; these were no more than were to be expected in a population heavily infested with intestinal worms and other parasites, and in the very few cases where the symptoms were severe enough to justify further investigation the stools as a rule revealed only parasites or pathogenic bacteria. A few children died during the vaccination programme, but their numbers were less than would be expected from the mortality rate, and the causes of death were in all cases shown to be other than poliomyelitis.

The experience gained in Colombia was made use of in Nicaragua, where an epidemic occurring in 1958 caused 254 cases of paralytic poliomyelitis and 18 deaths, all due to type 2 poliovirus. A vaccination programme initiated there with PASB help was described at the International Conference on Live Poliovirus Vaccines organized under the auspices of WHO and the Sister Elizabeth Kenny Foundation in Washington in June 1959 and reported in the same issue of the *Boletín de la Oficina Sanitaria Panamericana* as the campaign in Colombia.[2]

After a laboratory investigation to identify the epidemic, a house-to-house campaign was begun in the city and department of Managua, and 42 199 children under 10 years of age were vaccinated orally with live attenuated type 2 virus within 12 days. At intervals of three weeks type 3 and type 1 vaccines were then administered. After the vaccination programme was completed a maintenance programme was begun, trivalent vaccine being administered to all the newborn. From September 1958 till June 1959 59 855 children were vaccinated with type 2 virus, 54 732 with type 3, and 49 585 with all three types. These figures represent 98%, 91% and 82% respectively of the population of Managua under 10 years of age. The vaccine had no ill effects.

In the 10 months subsequent to the completion of this programme no cases of paralytic poliomyelitis were notified in Managua, where, for the last 8 or more years, there has not been so long a period free from cases.

[1] *Bol. Ofic. sanit. panamer.*, 1959, **47**, 187

[2] *Bol. Ofic. sanit. panamer.*, 1959, **47**, 201

Medical supervision in radiation work

The medical supervision of persons working with all kinds of ionizing radiations, including X-ray operators, laboratory research workers, hospital technicians, and the staffs of atomic energy plants, was discussed by a WHO Expert Committee on Medical Supervision in Radiation Work, which met in Geneva early in October 1959. Its findings will be of particular interest to governments formulating regulations and laws on the protection of these workers, as well as to such bodies as the International Labour Organisation and the International Atomic Energy Agency.

The Committee found that the health protection of workers in atomic energy installations has been of an exceptionally high standard. This is because the potential hazards of radiations had been intensively studied ever since the discovery of X-rays and radioactivity, and were fully appreciated at the time atomic energy developments began. It was considered that the health problems of radiation workers should be viewed in their true perspective, i.e., as being similar to those of workers with other chemically toxic or physically injurious agents commonly encountered in industry and modern life.

An account of the Committee's work will be published in the Chronicle when its report appears.

Non-proprietary names for pharmaceutical preparations

A Sub-Committee on Non-Proprietary Names of the WHO Expert Committee on Specifications for Pharmaceutical Preparations met in Geneva, from 5 to 7 October 1959, to select proposed international non-proprietary names for new pharmaceutical substances introduced or about to be introduced into therapeutics. With the growing number of such substances, the selection of suitable non-proprietary names requires more and more ingenuity; their adoption and use in different countries help to prevent confusion and errors in distribution and dispensing.

In accordance with the WHO Procedure for the Selection of Recommended International Non-Proprietary Names for Pharmaceutical Preparations,[1] 756 proposed international non-proprietary names have already been published in eight lists in the Chronicle; this procedure enables governments, firms and other interested agencies to check whether the proposed names conflict with trade and other names in their own countries. The number of objections received following publication of these lists, has been steadily decreasing and a recapitulative list is now in preparation.

As well as selecting more than 100 proposed names, which will be published within the next few months, the Sub-Committee attributed names to a number of drugs liable to produce addiction which, although they may not be introduced into therapeutics, need non-proprietary names for the purpose of international control. It also re-examined the Organization's General Principles for Guidance in Devising International Non-Proprietary Names.[2]

Addiction-producing drugs

Meeting in Geneva from 19 to 24 October 1959, the WHO Expert Committee on Addiction-Producing Drugs considered the addiction liability of a number of new analgesic drugs from different groups of therapeutic substances with morphine-like effect. On the basis of these recommendations the Director-General will decide on the status of international control to be applied in each case. His decisions will be transmitted to the Secretary-General of the United Nations, who will communicate them to the States parties to the various international conventions on the control of narcotic drugs.

The Committee also considered technical questions relating to the international control of narcotic drugs, with special reference to the new draft of a "Single Convention on Narcotic Drugs". These included: the assessment of the addiction liability of drugs; the interaction of analgesic and addiction-producing properties; and the relationship between analgesic and antitussive properties. The Committee also reviewed the situation with regard to dangerous drugs not covered expressly by the international conventions on narcotics.

[1] See *WHO Chronicle*, 1959, **13**, 157.
[2] See *WHO Chronicle*, 1959, **13**, 159.

The Committee's work will be reviewed in the Chronicle when its report is published.

Post-basic nursing education

A WHO Conference on Post-Basic Nursing Education Programmes for Foreign Students was held in Geneva, from 5 to 14 October 1959, to consider how post-basic courses for nurses studying outside their own countries could best be adapted to meet their special needs more closely and to prepare them for more effective leadership.

The participants in the Conference came from five of the six WHO regions, and included nurses who had studied abroad, nursing administrators, and faculty members of institutions receiving foreign nursing students. There were also representatives of organizations sponsoring fellowship programmes or concerned with placing students. A working paper was prepared for the Conference by the WHO Secretariat on the basis of information provided by 135 nurses from 37 countries who have received post-basic training abroad at a total of 38 institutions in 12 countries, and by the faculties of 26 schools in 12 countries.

Inter-Regional Trachoma Conference

In all the countries of North Africa and the Eastern Mediterranean Region, trachoma has the same epidemiological features, and is often intimately associated with acute conjunctivitis. It therefore seems that the disease could be dealt with by similar prophylactic and therapeutic methods in these countries, and that the experience already gained by some of them in this respect could be of great benefit to the others.

A Trachoma Conference, organized jointly by the WHO Regional Offices for Europe and the Eastern Mediterranean, was held in Tunis from 15 to 24 October 1959. It was attended by ophthalmologists from 14 North African and Eastern Mediterranean countries, who exchanged information on trachoma and allied eye diseases, and planned studies on aspects of the subject as yet incompletely understood. The principal method of control discussed was treatment by antibiotic ointments, which had already been used successfully on a large scale in internationally assisted campaigns in Algeria, Morocco, Tunis, and the United Arab Republic (Province of Egypt), and would therefore seem indicated for use elsewhere in the Mediterranean area.

The development of local health services

The development of health services is in general closely linked to social and economic changes, and their quality depends on the availability of a team of devoted and well-trained public health workers, who keep abreast of new knowledge and techniques in their respective fields. Self-examination and self-criticism are essential to the progress of such services.

On the recommendation of a WHO Study Group on Local Health Service, which met in 1954, pilot studies on local health services have been carried out in selected areas by the Governments of India, the Netherlands, Puerto Rico, Sweden, the Union of South Africa, and the United Kingdom.

The results of these pilot studies, as well as needs for further development, were discussed by a WHO Expert Committee on Public Health Administration, which met in Geneva from 12 to 17 October 1959. The participants included public health administrators from the six countries where the pilot studies were carried out.

Training of sanitation personnel

In many Asian countries the sickness rate could probably be halved by providing safe water supplies and proper facilities for the disposal of human wastes. One of the greatest obstacles to improved environmental sanitation in the Western Pacific Region is the serious shortage of sanitation personnel and of facilities for their training. A seminar on the education and training of sanitation personnel was held in Tokyo by the WHO Regional Office for the Western Pacific, from 21 October to 5 November 1959, at the invitation of the Japanese Government. It was attended by some 40 health workers from 17 countries and territories.

The seminar reviewed the present status of education and training of sanitation personnel in the various countries of the Region, together with present and future requirements in this field. Promising techniques and trends in environmental sanitation were discussed, and principles established for improved sanitation training with particular reference to the conditions and resources of the Region.

Teacher preparation for health education

The importance of the teacher's contribution to the health of schoolchildren is now being increasingly recognized by health and educational authorities, and has been the subject of special discussions by UNESCO's International Advisory Committee on the School Curriculum and by the recent Conference of the International Union for the Health Education of the Public at Düsseldorf, Germany.

A Joint WHO/UNESCO Expert Committee on Teacher Preparation for Health Education met in Geneva, from 2 to 7 November 1959, to discuss how teachers may learn the elements of healthy living and help to achieve better health for their pupils and for the community.

In preparation for the meeting, members of the Joint Committee and other experts drafted working papers and reports on such topics as health facilities in teacher-training institutions, the educational aspects of such facilities, and the formal health instruction of teachers and student teachers.

Other subjects discussed included: the nature and extent of teacher responsibility for the health of schoolchildren; ways in which schools can contribute to child health; opportunities for health education by teachers; methods and planning.

An account of the Joint Committee's work will appear in the *WHO Chronicle* when its report is published.

Vaccination practices in Europe

Because of the speed of modern communications, infectious diseases cross frontiers with ever-increasing frequency and ease. For this reason, preventing their spread is both a national and an international responsibility. Against the majority of them, vaccination remains one of the most powerful weapons available.

Present vaccination practices in Europe and the possibility of controlling, and eventually eradicating, infectious diseases by vaccination were the main topics considered at a Conference on the Control of Infectious Diseases through Vaccination Programmes, convened by the WHO Regional Office for Europe at Rabat, Morocco, from 23 to 31 October 1959. The Conference discussed the control by vaccination—principally in childhood—of such communicable diseases as smallpox, diphtheria, whooping cough, tetanus, poliomyelitis and tuberculosis. It also examined the vaccination of both adults and children against such diseases as influenza, typhoid fever, brucellosis, rabies, encephalitis, hepatitis, etc. The advantages and risks of different procedures were studied. It is hoped to use the findings of the Conference as the basis for a manual on immunization methods and procedures in mass vaccination.

International medical research

Problems of international medical research with special reference to the role of WHO in this field are the subject of a recent book *World Medical Research : Principles and Practices*, published by Butterworth and Company, London. The author is Dr Harry Sutherland Gear, a former Assistant Director-General of WHO.

The book opens with a brief historical survey of the growth of science and scientific method, and goes on to review principles and methods in present-day international medical research. Examples are given of the part played by research in routine WHO programmes and of special research programmes undertaken by the Organization on communicable diseases, insecticide resistance, cancer and nutrition. Research by the United Nations and WHO's sister agencies on matters of public health interest is also reviewed.

People and Places

Preventive and social medicine

Dr A. L. Banks, Fellow of Gonville and Caius College, Cambridge, has accepted a one-year assignment with WHO as Visiting Professor of Preventive and Social Medicine at Lucknow Medical College, India. He will advise and assist the Principal of the College in developing the department of preventive and social medicine, co-operate with other faculty members to see that adequate attention is given to this subject in all parts of the medical curriculum, train an Indian doctor to succeed him in the post, and help to develop a field training area.

Dr Banks served for many years as a Principal Medical Officer at the Ministry of Health, London, and since 1949 has been Professor of Human Ecology at the University of Cambridge. He is a member of the WHO Expert Panel on Public Health Administration.

Chemotherapy of tuberculosis

Dr D. A. Mitchison, Director of the Group for Research on Drug-Sensitivity in Tuberculosis, Medical Research Council of Great Britain, recently spent four weeks in India assessing and planning the bacteriological laboratory work at the internationally assisted Tuberculosis Chemotherapy Centre in Madras.[1]

A graduate of Trinity College, Cambridge, and University College Hospital Medical School, London, Dr Mitchison served as bacteriologist at the Madras Centre from December 1956 to February 1958.

Iron deficiency anaemia

Dr C. A. Finch, of the United States, has undertaken a preliminary survey of centres in Africa and Asia where research on iron deficiency anaemia can be carried out under WHO's programme of international medical research.

Dr Finch is Professor of Clinical Medicine at the University of Washington School of Medicine, Seattle, Wash., USA, and a Fellow of the International Society of Haematology. He has considerable experience of research work on iron metabolism employing radioactive tracers.

Home nursing

Miss Eli Magnussen, Chief of the Nursing Section of the National Health Service of Denmark, has just visited the health departments of fifteen leading cities in the United States and Canada to discuss and advise on problems of home nursing, including the care of the aged. This visit was arranged by the Pan American Sanitary Bureau (WHO Regional Office for the Americas), in co-operation with the US Public Health Service and the Department of National Health and Welfare of Canada.

Miss Magnussen, who holds degrees from schools of nursing and physiotherapy in Denmark, Finland and Sweden, has served on a number of WHO Expert Committees, and from 1950 to 1952 was nursing adviser to the WHO Regional Office for the Eastern Mediterranean.

Safety of food additives

WHO is making a study of the pharmacological and toxicological effects of certain substances widely used as food additives, and for this purpose has collected all available literature on antimicrobial preservatives and antioxidants. In addition, scientists from all over the world have been asked by the Organization for their opinions on the possible harmfulness of these substances.

Professor R. Truhaut, Professor of Toxicology at the University of Paris, and Dr H. van Genderen, Chief of the Pharmacological and Toxicological Department in the National Institute of Public Health, Utrecht, are helping WHO to analyse the data collected, and will advise it on steps to be taken for the further study of the problem.

Health laboratory services in Syria

Dr Gunnar Löfström, Professor of Bacteriology at the Institute of Hygiene and Bacteriology,

[1] See *WHO Chronicle*, 1959, **13**, 397.

University of Upsala, Sweden, has just spent two months in the United Arab Republic (Province of Syria) to advise on ways of strengthening the WHO-assisted Central Public Health Laboratory in Damascus and extending its services to the rest of the Province. Dr Löfström was Chief Medical Officer, Health Laboratory Methods, WHO Headquarters, from 1955 to 1957.

Sanitary engineer for Tonga

Mr Benedicto Adan, sanitary engineering adviser in the Bureau of Health Services, Philippine Department of Health, has been appointed sanitary engineer in a WHO-assisted project in the South Pacific Kingdom of Tonga. The aim of the project is to improve sanitation services and the training of sanitation personnel. A pilot environmental sanitation programme in a number of villages in Tonga is expected to be undertaken following studies by WHO experts.

Mr Adan, who is a graduate of the Universities of Kansas and North Carolina, has had wide experience of environmental sanitation work in the Philippines.

CORRIGENDUM

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p. 287, left-hand column, lines 32-34

delete Smallpox eradication campaigns are also being planned in Ethiopia and Iran.

insert Smallpox eradication campaigns have already been started or are being planned in Iran and Ethiopia respectively

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